STATE OF NEVADA

Nevada

Criterion-Referenced Tests

SCIENCE

REVIEW GUIDE

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TABLE OF CONTENTS

OVERVIEW

Purpose

The Criterion Referenced Tests (CRT), as mandated by legislation (Nevada Revised Statute 389.550), are designed to provide a means of measuring student academic achievement and proficiency in the Nevada State Content and Performance Standards. They are intended to help ensure that students are appropriately prepared in the curricula as set forth in the state standards. Unlike a norm-referenced test that is designed to compare an individual student, school, district, or state test score to an average score as determined by an entire test-taking population, the criterion-referenced test score is reported in terms of both group and individual student outcomes based on a pre-determined criterion of correct responses to measure proficiency and achievement levels.

This review guide is intended to be used by teachers, principals, and school districts as a supplemental tool — one that complements current efforts aimed at preparing students for the state proficiency examinations and/or remedial efforts based in part on student test performance. Each test includes only a portion of the curriculum content that students are expected to know. Although the guide provides a sampling of representative items for the CRT, the sample of items does not constitute a practice test and was not designed to provide "drill" activities.

Rationale and Philosophy

The Nevada comprehensive assessment system serves as an ongoing evaluative technique that allows monitoring of the extent to which students are acquiring necessary knowledge and skills. While necessary knowledge and skills may be characterized in multiple ways, they are primarily defined through the state content and performance standards that provide the basis of aligned curriculum and instructional practice. Assessment can be viewed as multi-faceted. It can be considered as an objective monitoring tool that stands outside the triangle of standards, curriculum, and instruction. It can also be regarded as an integral aspect of curriculum and as an instructional tool. It may be that different assessment strategies can serve these multiple facets. If so, as is the case with standards, curriculum, and instruction, multiple forms of assessment, including varied large-scale assessments and site-based assessments, must be interlocked or aligned. As such, Nevada's assessment efforts are part of statewide systemic reform.

National Assessment of Educational Progress (NAEP)

Nevada is among the states that receive Title I funding and must therefore participate in state NAEP norm-referenced assessments in reading and mathematics at grades 4 and 8. A sample of Nevada students will be tested through the National Assessment of Educational Progress program in reading annually each spring from years 2002 to 2010 and in mathematics from 2003 to 2010. In addition, the NAEP science assessment will be given in years 2004 and 2008 and the writing assessment will be given in years 2002, 2006, and 2010. Information on these assessments may be obtained at http://nces.ed.gov/nationsreportcard/.

Norm-Referenced Assessment

The norm-referenced assessments, as described in Nevada Revised Statute 389.015, are administered annually each winter to every Nevada student in grades 4, 7, and 10. Subjects tested include reading/language arts, mathematics, science, and social studies. The current testing contractor is Riverside Publishing Company, and it is responsible for the distribution and scoring of the Iowa Tests of Basic Skills in grades 4 and 7, and the Iowa Test of Educational Development in grade 10. For more information about the Iowa Tests of Educational Development in grade 10, go to http://www.riverpub.com/products/group/ited_a/home.html.

Criterion-Referenced Assessment

The Nevada CRT program was initially mandated in 1999 and piloted in the 2000-2001 school year in mathematics and reading in the 3rd and 5th grades. The 5th grade science test and the 8th grade mathematics, reading, and science tests were field tested in the 2002-2003 school year. The test items are drafted by Nevada teachers with the assistance of the WestEd Regional Educational Laboratory, the Nevada Department of Education, and Measured Progress. Nevada test items undergo a thorough review for alignment with Nevada Standards and for possible bias. Students are tested within 10 days either side of the 120th day of instruction. Each test takes approximately 120 minutes and contains between 50 and 75 items. Ten to fifteen field test items, used for future test development, are embedded in the total item count number.

Since each form of assessment taken individually may serve a narrower purpose, each assessment in the Nevada Proficiency Examination Program must be considered in conjunction with all other forms of assessment. This concept is consistent with the adage that the whole is greater than the sum of its parts. Each form of assessment provides useful bits of information, but the interpretation of student and school achievement is better informed by looking at the influence of multiple measures. (See Figures 1 and 2.)

Figure 1 — A Complementary System Of State-, Local-, And Building-Level Assessment Practices

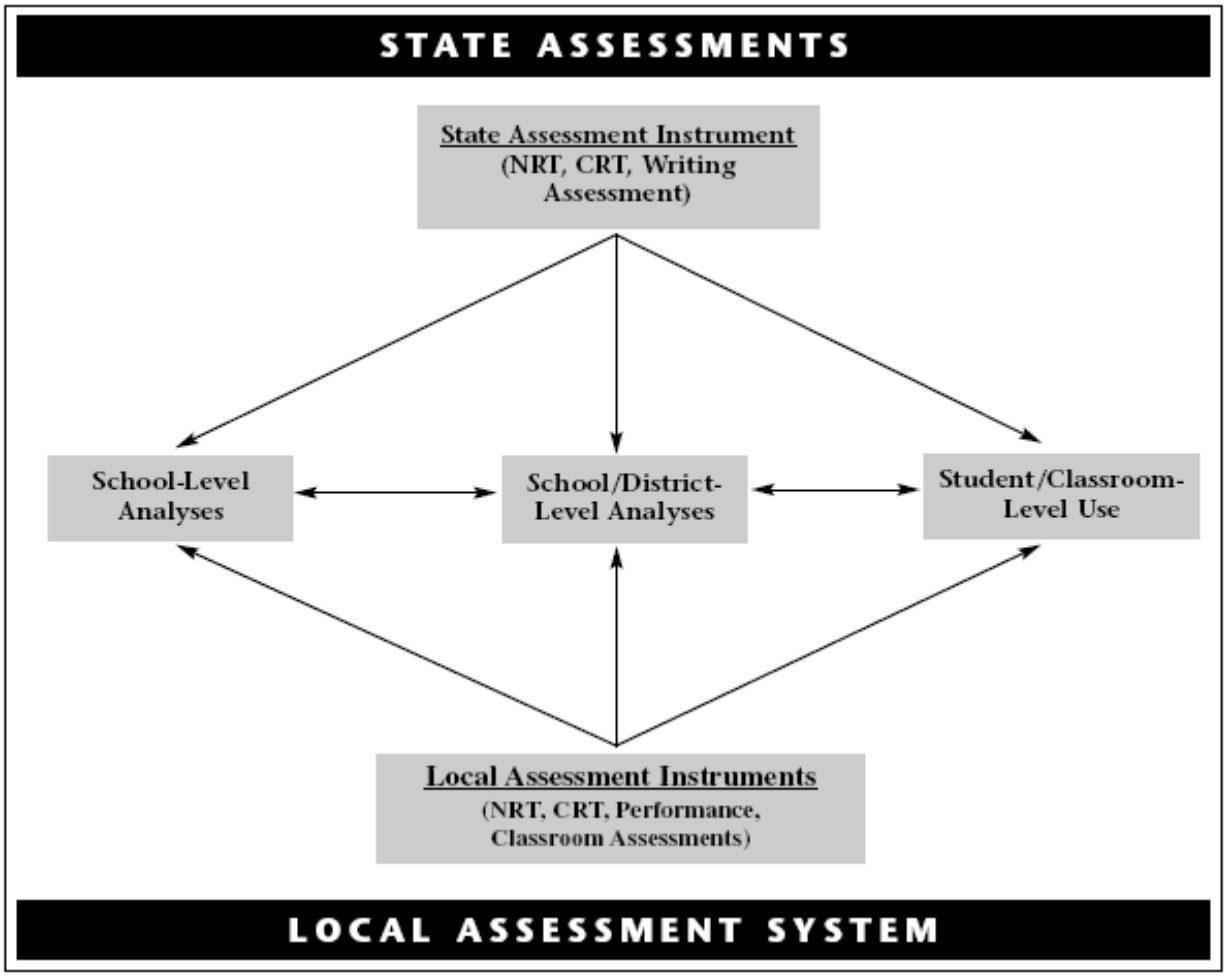
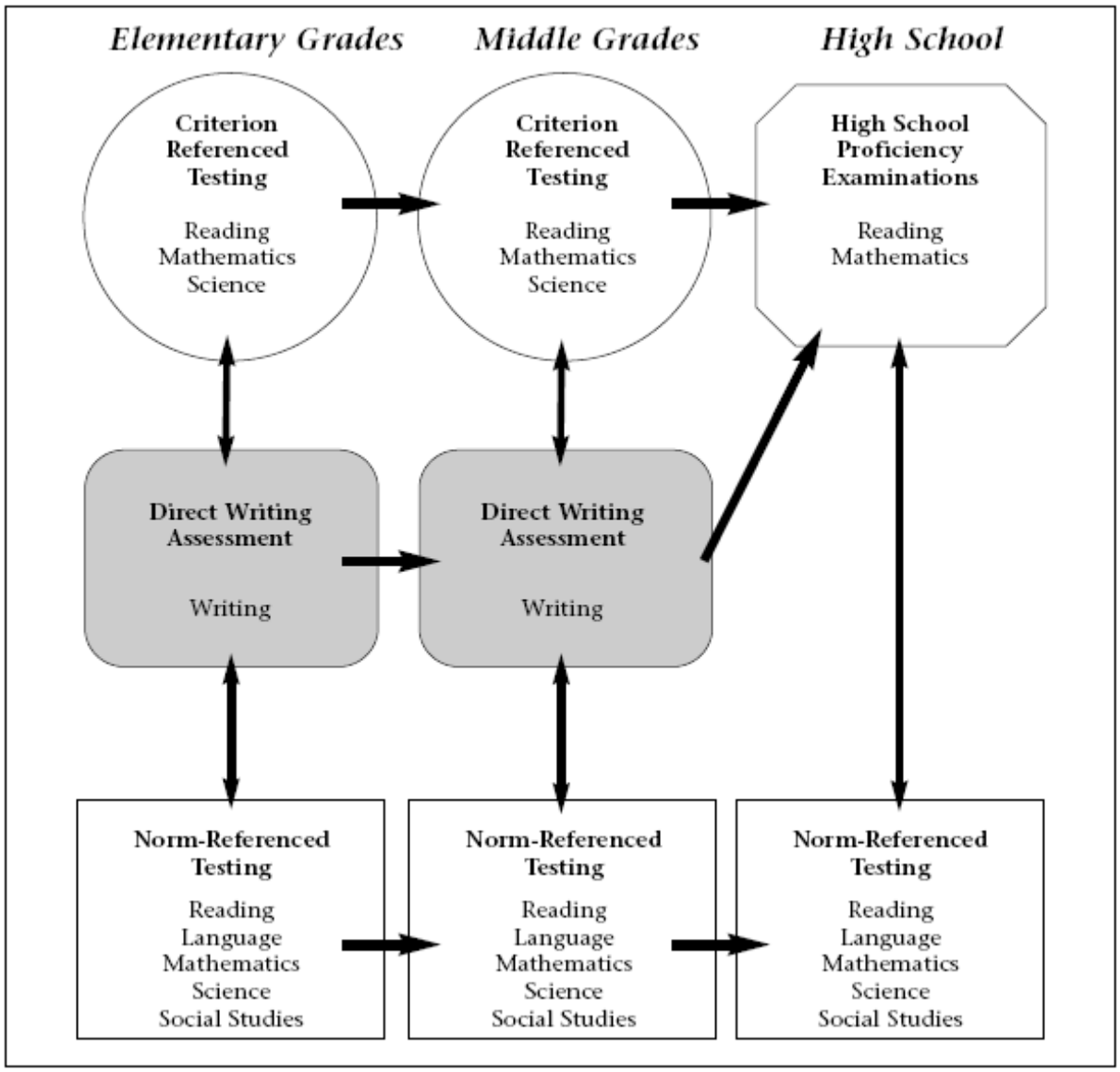


Figure 2 — State-level Assessment Flow



Accountability and Alignment

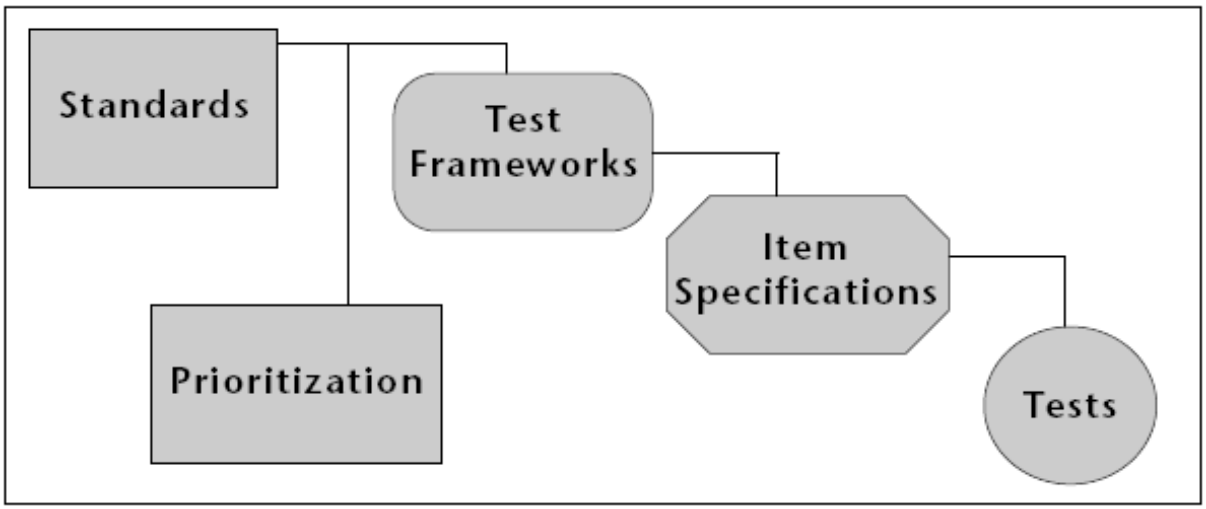
Current reform initiatives, most recently the federal No Child Left Behind Act, are built on the notion of "results-based" accountability. Stated simply, students are responsible for learning standards-based content knowledge and skills, and educators are responsible for providing students with the opportunity to learn and demonstrate that knowledge and those skills.

This much is known about accountability systems and the role of assessments: When the stakes are high, whether applied to students or to schools, the assessments drive classroom instruction and/or behavior and there is motivation to perform well on the accountability measures. Directing instructional change can be desirable and is arguably the goal or role of accountability. How assessments affect instruction or curriculum is a key concern and leads to the issue of alignment between standards and assessments. Unless this alignment is clear, the results of accountability cannot be reliable.

For the assessments and the accountability system to support the overall goals of improving student learning and school improvement, the assessments must measure the standards. Unfortunately, the language of "standards" is not always easily applied to assessment or measurement. Work must be done

to translate the standards into a form that is conducive to assessment, yet does not compromise academic expectations. This can be achieved in multiple ways and has been accomplished in Nevada using the following method (See Figure 3.).

Figure 3 — Translation is one step in the alignment



The articulation of standards into a form appropriate for school- and classroom-level assessments is needed for a variety of reasons. First of all, it provides a clear plan for developing test items and tasks. This gives some assurance that, at the state level, measurements are aligned with expected proficiency of student performance based on the state standards. In addition, it supports the development of school district or classroom assessments that are aligned to both the state academic expectations and other forms of assessment that comprise the total assessment system. Aligning different types of assessments is required to achieve systemic reform.

The articulation of standards, ultimately in the form of assessment, also helps serve another critical purpose. It communicates what is expected from students in the form of knowledge and skills acquisition as well as what is expected from schools in terms of curriculum and instructional delivery. In addition, students, parents, and teachers must know how students will be assessed and the decisions that will be made based on their performance.

One of the critical features of the interpretation of standards in Nevada has been the prioritization of standards. After the standards were written and adopted, a statewide committee of district-nominated educators were brought together to make decisions regarding the assessment of the standards. Groups of teachers and other educators had the task of taking each standard and objective and noting whether it was indicative of being enduring (i.e., essential knowledge and skills students need to internalize and retain), important (i.e., knowledge and skills students need to expand their understanding, make connections, and comprehend new or unfamiliar information), or worthwhile (i.e., students should be familiar with key concepts, ideas, facts, and terms). Next, educators made decisions as to whether a standard/objective might best be assessed at the state or local level. This process resulted in a clear subset of standards and objectives that were denoted as being enduring or important as well as testable at the state level.

The prioritization process is important for several reasons. First, the breadth and depth of the Nevada Content Standards make it very difficult to provide a comprehensive assessment. Second, although a lengthy assessment process might be seen as optimal, cost and time spent testing are practical constraints. Third, the prioritization process allows for a finer distinction in those aspects of the standards that are

essential for state assessment. This, of course, is a critical undertaking. As stated previously, testing will direct curriculum and instruction, and any narrowing of curricular scope could be detrimental to including all the standards in classroom instruction. It is important to note that the prioritization process did not exclude any of the standards/objectives from assessment. Instead, it called for the assessment of all standards/objectives at the local level, and a specified set of knowledge/skills to be assessed at the state level.

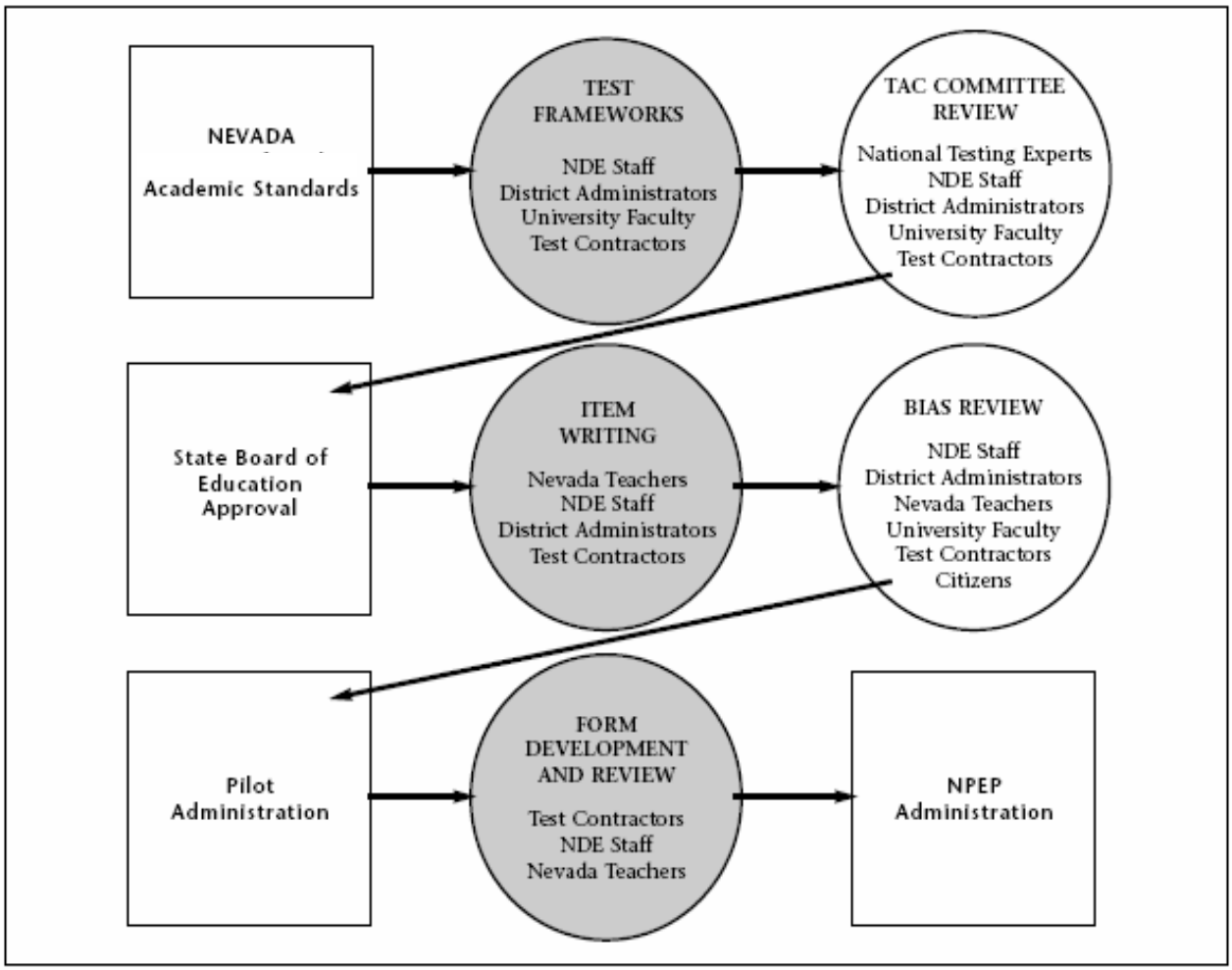
Development

The test development process for state assessments is comprehensive and involves national and local educators, as well as technical assistance from regional education laboratories and testing contractors. Shown in Figure 4 is the general development process. It starts with the state standards followed by the development of test frameworks and specifications and the review of these documents by a Technical Advisory Committee (TAC) and policy boards. After approval, Nevada educators begin the item writing process, which includes the drafting of items/tasks and the qualitative bias review of test items/tasks and reading passages. Once drafted and reviewed, items are subjected to a field administration where the items are field-tested with students. Based on a statistical and qualitative review of the piloted items, test forms are constructed, submitted for a comprehensive review, and ultimately formally administered to students.

The cornerstone of the development process of the Nevada Proficiency Examination Program is teacher involvement in the drafting and reviewing of test items. Prior to writing items, teachers are provided with a thorough training that is designed to assist in drafting quality items that are free from bias and that are clearly aligned to specific prioritized content standards. Throughout item writing sessions, time is dedicated to peer review of item drafts, including validation of the matching of items to specific content skills.

After items are written, they are edited by a testing contractor and subsequently submitted for a comprehensive, qualitative review for potential bias. Although a variety of educators and other citizens are involved in the review process, teachers always serve in this primary role. Items are analyzed to ensure they do not convey insensitivity to a particular group, do not violate privacy issues, and do not differentially impact opportunity and access. Reliance on teacher involvement in the writing and review process provides confidence that the high school proficiency examinations accurately measure content being taught in Nevada classrooms.

Figure 4 — The NPEP Development Process



Constructed-Response Items

Constructed-response items are included in the fourth through eighth grade criterion referenced tests. The constructed-response items present students with a question or questions that require students to respond in written form. Typically items ask students to not only recall knowledge from a passage, but also demonstrate more complex cognitive behaviors such as organizing, summarizing, comparing, relating, analyzing, inferring, concluding, predicting, solving, and/or applying. A constructed-response item can come in several different formats. An item may be specific in its request (e.g., "Describe three different ways that…") or more open-ended (e.g., "Describe different ways that…and explain why…").

Constructed-responses will have a set, which scaffolds the students' thinking, and directions for the task. Students receive a score of 0-3 points on their answer, with 0 being the lowest and 3 being the highest. A score of 2 or 3 is deemed proficient. A student's score depends on how closely his or her answer matches the description in the item-specific rubric and the anchor papers for each constructed-response item.

For each constructed-response item, an item specific rubric is designed based on the general rubric. (See page xx for the fifth grade example.) Anchor papers, which are exemplary responses of typical student responses at each score point, are selected to guide the trained readers who score students' responses.

Reporting

In order for assessments to serve the purposes of improving student learning and classroom instruction, assessment results must be reported in a manner that facilitates the interpretation of student performance. The reporting of results must be tied directly to the expectations for student learning.

The state provides a variety of score reports in paper format including student, school, district, and state level summary reports. Additionally, "raw" data is provided to school districts in electronic format to allow for more precise analyses. The integration of results from the multiple levels of assessment (i.e., state vs. classroom) requires the use of electronic media. The state is currently pursuing the adoption of web-based reporting software that can make the "raw" data available in varying degrees of specificity to all education stakeholders. In particular, teachers would be able to access data representing their own classroom, school, and/or district.

Although the electronic transfer of results is optimal, the paper reports disseminated by the state must still convey important information with clarity. The student level summary report conveys both diagnostic and general achievement information (see Figure 5 for 5th grade example). It provides information pertaining to the number of items possible, the number of items correct, and the percentage of items answered correctly relative to a particular content standard (i.e., in Reading, *Read to Comprehend*, *Interpret and Evaluate Literature*, or in Math, *Algebra and Functions*). In addition, it provides information on the cognitive domain (i.e., in Reading, *Developing an Interpretation* or *Procedural Knowledge* or in Math, *Procedural Knowledge*).

The scale score obtained by the student is specified at the top of the score sheet and a key is provided at the bottom qualifying the achievement levels by descriptors of the scale scores, i.e., emerging/developing, approaching standard, meeting standard, or exceeding standard. The scale score is derived by mapping each raw score to a scale score through a linear transformation process where student ability, test difficulty, and student guessing are factored into the equation. The cut scores of 200 for *Approaches Standard* and 300 for *Meets Standard* were established during the Nevada Standard Setting process in 2002. The *Exceeds Standard* cut is also fixed, but may vary minimally for each test. While the raw score percentage correct required to attain each achievement category may change from year to year and may differ from subject to subject, the scale score cuts remain constant. As a result, for some test forms or subjects, students could receive relatively high percentages of correct answers and not meet the standard, while with other forms they could receive relatively moderate scores and could meet or even exceed the standard, depending on the difficulty of the test form and the achievement level cuts established in the standard setting process.

The number/percentage correct information provided on the Student-Level Summary Score Report has limited diagnostic value. For a particular administration, it does indicate performance relative to the more specified content areas; but the limited number of questions related to any particular standard or domain, in addition to the number of skills encompassed within the standard, prevents a highly reliable estimate of performance. However, if this information is combined with classroom-based information, a strong diagnostic picture can be created. For example, if a student correctly answers 5 of 10 items pertaining to *Numbers and Number Sense* on the state test, it would suggest some relative weakness. However, because each test form is but a sampling of content from the standards, it is important to validate the state level performance information with classroom level information relative to *Numbers and Number Sense* (assignment grades, class quizzes, teacher observation, etc.) before major remedial efforts would be implemented for any student.

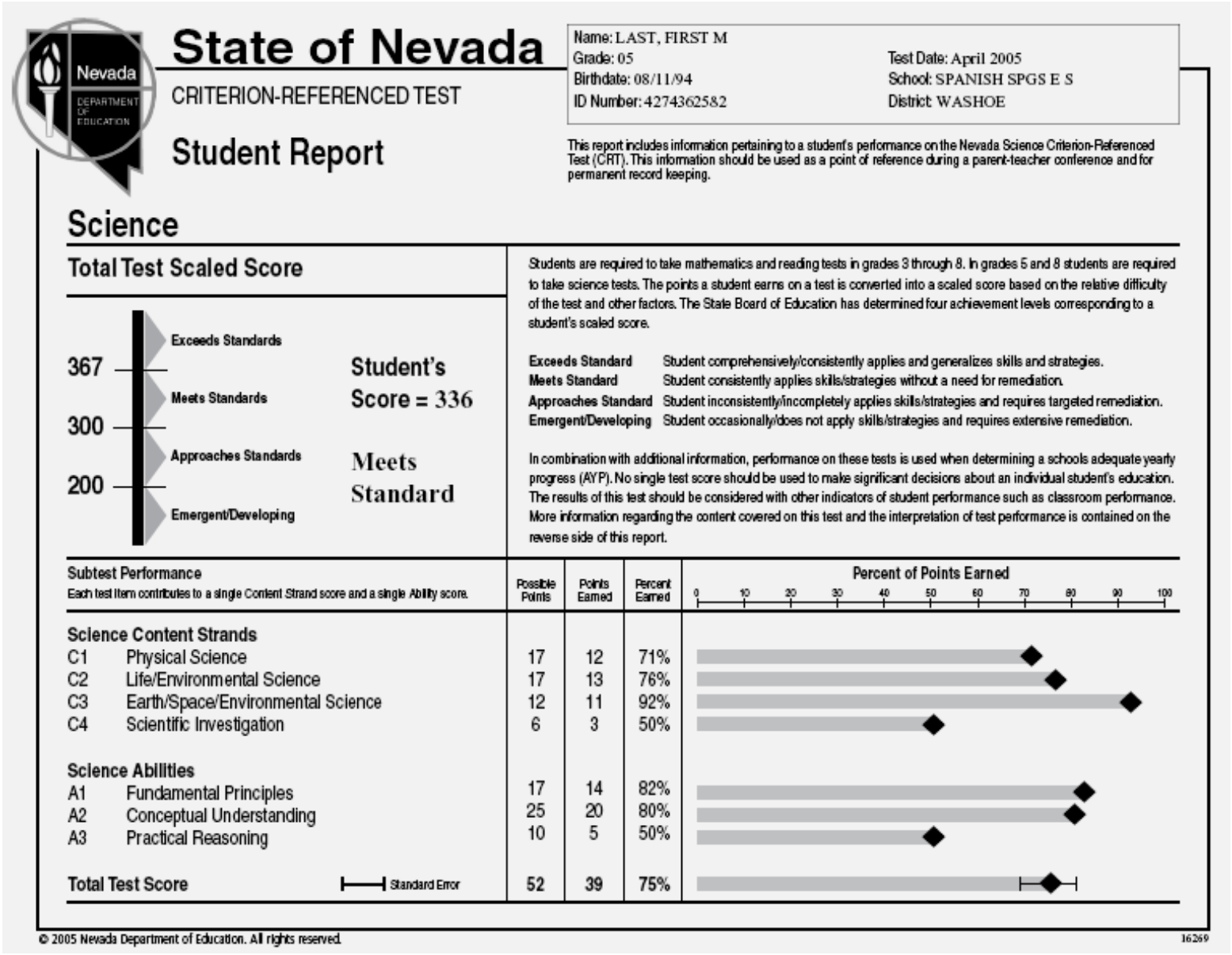


Figure 5 — Student-Level Summary Score Report Grade 3 (Front)

Figure 5 — Student-Level Summary Score Report Grade 3 (Back)

SCIENCE

Additional information about the Nevada content areas can be viewed at the Nevada Department of Education website, www.doe.nv.gov. The Nevada Criterion-Referenced Examination in Science contains passage selections with a variety of questions ranging in difficulty which test how well a student can perform science activities based on:

SCIENCE CONTENT STRANDS

Physical Science (C1)
The physical science component will center on Properties of Matter, Energy, and Electrical Circuits

Life/Environmental Science (C2)
The life science component requires that students demonstrate an understanding of Structure and Functions of Plants and Animals, Growth and Change in Plants and Animals, and Ecology

Earth/Space/Environmental Science (C3)
The Earth/Space and Environmental Science component looks at students' understanding of Earth Structures and Ecosystems

Scientific Investigation (C4)
Students demonstrate age- and grade-level appropriate knowledge and skills related to designing and performing scientific investigations

SCIENCE ABILITIES

Fundamental Principles (A1)
Basic knowledge of science content and processes, including information about the processes of scientific investigations

Conceptual Understanding (A2)
Beyond basic facts to stress the connections between basic facts and concepts and the larger general organizing principles (the "Big Ideas") of science

Practical Reasoning (A3)
Questions in this category assess students' ability to use and apply their scientific understanding to solve new and unique real-world problems

The test results presented in this report should be used in combination with other information to get a complete picture of a student's true achievement level. Many factors can affect a student's performance on a test either positively (e.g. ability, luck, easy items) or negatively (e.g., test anxiety, lack of sleep, hard items). Because of this, a student's true achievement level may be greater than or less than his/her performance on a single test. These differences are sometimes referred to as measurement error and can affect the reliability of a test score. The standard error for the student's total performance on this test has been reported. Using the student's total score, the standard error identifies the range within which the student's true achievement level falls.

The student's total score and corresponding achievement level are based on the student's responses to a large number of test items. Subtest or strand performance is based on far fewer items. Because of this, measurement error is greater and as a result, subtest scores should be used as general guides for identifying the areas where the student performed well and the areas that need additional focus for improvement. Subtest performance has been reported to provide the student with useful information regarding strengths and weaknesses on a given testing occasion but this information should be interpreted cautiously and important instructional decisions should not be made based upon subtest scores alone.

NEVADA SCIENCE CRT

Review Materials

NEVADA SCIENCE CRT

Introduction

The National Science Education Standards define science literacy in a very broad sense.

Scientific literacy is the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. It also includes specific types of abilities.

Scientific literacy means that a person can ask, find, or determine answers to questions derived from curiosity about everyday experiences. It means that a person has the ability to describe, explain, and predict natural phenomena. Scientific literacy entails being able to read with understanding articles about science in the popular press and to engage in social conversation about the validity of the conclusions. Scientific literacy implies that a person can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed. A literate citizen should be able to evaluate the quality of scientific information on the basis of its source and the methods used to generate it. Scientific literacy also implies the capacity to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriately.

Individuals display their scientific literacy in different ways, such as appropriately using technical terms, or applying scientific concepts and processes. And individuals often will have differences in literacy in different domains, such as more understanding of life-science concepts and words, and less understanding of physical-science concepts and words.

Scientific literacy has different degrees and forms; it expands and deepens over a lifetime, not just during the years in school. But the attitudes and values established toward science in the early years will shape a person's development of scientific literacy as an adult.

NSES, http://www.nap.edu/html/nses/html/2.html#perspectives

The goals of science assessments in Nevada are at least threefold. First, they provide a measure of student achievement relative to the intended learning outcomes. Assessment and learning are closely related, so as the intended outcomes are defined for assessment, teachers and students will redefine their expectations to meet the outcomes. Second, they should provide an operational definition of important curricula, and a mechanism for communicating the expectations of the standards to everyone concerned. Third, there should be a feedback mechanism in the state's science education system that can lead to changes by stimulating adjustments in policy, guiding professional development, promoting changes in instructional practices, and encouraging students to improve their understanding of science.

Nevada's Content Standards in Science define the breadth and depth of science that all Nevada students will come to understand. The intended learning outcomes of science education within the science standards are rich and varied. These outcomes include:

- Demonstrate the processes of science by posing questions and investigating phenomena through language, methods, and instruments of science;
- Acquire scientific knowledge by applying concepts, theories, principles, and laws from life, physical, and Earth/space science;
- Demonstrate ways of thinking and acting inherent in the practice of science and exhibit an awareness of the historical and cultural contribution to the enterprise of science; and
- Demonstrate an ability to solve problems and make persona decisions about issues affecting the individual, society, and the environment.

The Nevada Science Content standards consist of 12 individual standards that are clustered into four unifying concepts for reporting purposes on the HSPE Science Assessment:

C1 – Nature of Science (Standards 1 and 2)
C2 – Physical Science (Standards 3 through 5)
C3 – Life Science (Standards 6 through 9)
C4 – Earth and Space Science (Standards 10 through 12)

Unifying Concept 1: Nature of Science

The CRT Science Assessments focus on the goal that all students understand the following nature of science concepts:

Content Standard 1: Scientific Inquiry

- Using data
- Recordkeeping
- Accuracy
- Safe experimentation
- Models

Content Standard 2: Science, Technology, and Society

- Risks and benefits
- Ethical behavior
- Collaboration

Unifying Concept 2: Physical Science

The CRT Science Assessments focus on the goal that all students understand the following physical science concepts:

Content Standard 3: Matter

- Properties of matter
- Mixtures and compounds
- Atomic structures

Content Standard 4: Forces and Motion

- Motion
- Forces

Content Standard 5: Energy

- Waves
- Forms and uses of energy
- Electricity

Unifying Concept 3: Life Science

The CRT Science Assessments focus on the goal that all students understand the following life science concepts:

Content Standard 6: Heredity

- DNA
- Predicting

Content Standard 7: Structure of Life

- Cells
- Disease

Content Standard 8: Organisms and Their Environment

- Cycles
- Ecosystems

Content Standard 9: Diversity of Life

- Evolution
- Natural Selection

Unifying Concept 4: Earth and Space Science

The CRT Science Assessments focus on the goal that all students understand the following Earth and space science concepts:

Content Standard 10: Atmospheric Processes and the Water Cycle

- Sun's energy
- Weather

Content Standard 11: Solar System and Universe

- Components of the universe
- Formation of the universe
- Celestial Motion

Content Standard 12: Earth's Composition and Structure

- Geologic processes
- Plate tectonics
- Earth's composition and resources

The questions on the exam are divided into three Ability Level (Cognitive Domain) categories.

A1 – Fundamental Principles

Questions in this category include the basic knowledge of science content and processes, and will assess a variety of information, including:

- Facts and events that the student learns from science instruction
- Information about the processes of scientific investigation

A2 – Conceptual Understanding

The primary goal of science instruction is to build a student's conceptual understanding. Questions in this category go beyond the basic facts to stress the connections between and organization of factual knowledge in science. Students will demonstrate their abilities to use information from a broad range of science content areas. Questions in this category will assess a variety of information, including:

- Concepts, facts, principles, laws, and theories used to explain observations or make predictions about the natural world
- Connections between basic facts and concepts and the larger general organizing principles (the "Big Ideas") of science

A3 – Practical Reasoning

Questions in this category assess students' ability to use and apply their scientific understanding to solve new and unique real-world problems. This is the dimension of the assessment where students demonstrate a broader, more applied understanding of science content. In addition to connections of specific content to the organizing principles, students should be able to apply their scientific understanding to areas and problems not directly linked to the classroom experience.

The science test items are divided among four unifying concepts. The balance of items between the concepts is determined by the numbers of objectives in each instructional strand included on the test. The balance of question types (Ability Levels) is derived from recommendations from the National Assessment of Educational Progress (NAEP) framework and the state's assessment development committees.

5th GRADE SCIENCE

An overview of the Criterion Referenced Test program is provided at the beginning of this review guide. Information about the purpose, rationale & philosophy, accountability & alignment, development, and reporting can answer questions to the broader details of the program.

The materials that follow include the performance standards for grade 5, the matrix of the test configuration, and examples of test items. A number of test items include explanations for the correct answer and distracters of each test item. It is important to note that the following examples are examples. They are not intended to establish limits of what will be on the test or limits to the ways the standards can be assessed.

Content standards 1 through 12 deal with students' abilities to understand and use science concepts. Listed below the content standards are the grade span benchmarks. The following is a description of the standards and those benchmarks tested. Those tested at the state level are check marked.

Nevada Science Standards and Grade Span Benchmarks

Standard 1: *Scientific Inquiry*

Students understand that science involves asking and answering questions and comparing the answers to what scientists know about the world.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

√ know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method.

- know how to compare the results of their experiments to what scientists already know about the world.

√ know how to draw conclusions from scientific evidence.

√ know graphic representations of recorded data can be used to make predictions.

√ know how to plan and conduct a safe and simple investigation.

√ know models are tools for learning about the things they are meant to resemble.

√ know observable patterns can be used to organize items and ideas.

5th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 2: *Science, Technology, and Society*

Students understand that many people, from all cultures and levels of ability, contribute to the fields of science and technology.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know that, throughout history, people of diverse cultures have provided scientific knowledge and technologies.
- √ know technologies impact society, both positively and negatively.
- ● know the benefits of working with a team and sharing findings.

Nevada Science Standards and Grade Span Benchmarks

Standard 3: *Matter*

Students understand properties of objects and materials.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know matter exists in different states (i.e., solid, liquid, gas) which have distinct physical properties.
- √ know heating or cooling can change some common materials, such as water, from one state to another.
- √ know materials can be classified by their observable physical and chemical properties (e.g., magnetism, conductivity, density, and solubility).
- √ know that, by combining two or more materials, the properties of that material can be different from the original materials.
- √ know the mass of a material remains constant whether it is together, in parts, or in a different state.
- √ know materials are composed of parts that are too small to be seen without magnification.

5th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 4: *Forces and Motion*

Students understand that forces can change the position and motion of an object.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know that, when an unbalanced force is applied to an object, the object either speeds up, slows down, or goes in a different direction.
- √ know how the strength of a force and mass of an object influence the amount of change in an object's motion.
- √ know a magnetic force causes certain kinds of objects to attract and repel each other.
- √ know electrically charged particles can attract or repel other electrically-charged material (eg., static electricity).
- √ know Earth's gravity pulls any object toward it without touching it.

Nevada Science Standards and Grade Span Benchmarks

Standard 5: *Energy*

Students understand that energy exists in different forms.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know light can be described in terms of simple properties (e.g., color, brightness, reflection).
- √ know the wave characteristics of sound.
- √ know heat is often produced as a byproduct when one form of energy is converted to another form (e.g., when machines and living organisms convert stored energy to motion).
- √ know heat can move from one object to another by conduction, and some materials conduct heat better than others.
- ● know the organization of a simple electrical circuit (i.e., battery or generator, wire, a complete loop through which the electrical current can pass).

5th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 6: *Heredity*

Students understand that some characteristics are inherited and some are not.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know some physical characteristics and behaviors that are inherited in animals and plants.
- √ know reproduction is an essential characteristic for the continuation of every species.
- √ know that, while offspring resemble their parents and each other, they also exhibit differences in characteristics.
- √ know how to observe and describe variations among individuals within the human population.
- √ know some animal behaviors are learned.

Nevada Science Standards and Grade Span Benchmarks

Standard 7: *Structure of Life*

Students understand that living things have specialized structures that perform a variety of life functions.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know plants and animals have structures that enable them to grow, reproduce, and survive.
- √ know living things have predictable life cycles.

5th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 8: *Organisms and Their Environment*

Students understand that there is a variety of ecosystems on Earth and organisms interact within their ecosystems.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know the organization of simple food webs.
- √ know organisms interact with each other and with the non-living parts of their ecosystem.
- √ know changes to an environment can be beneficial or detrimental to different organisms.
- √ know all organisms, including humans, can cause changes in their environments.
- √ know plants and animals have adaptations allowing them to survive in specific ecosystems.

Nevada Science Standards and Grade Span Benchmarks

Standard 9: *Diversity of Life*

Students understand that living things can be classified according to physical characteristics, behaviors, and habitats.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know animals and plants can be classified according to their observable characteristics.
- √ know fossils are evidence of past life.
- √ know differences among individuals within a species give them advantages and/or disadvantages in surviving and reproducing.

5th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 10: *Atmospheric Processes and the Water Cycle*

Students understand that science involves asking and answering questions and comparing the answers to what scientists know about the world.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

√ know the Sun is the main source of energy for planet Earth.

√ know the processes of the water cycle, including the role of the Sun.

● know most of Earth's surface is covered with fresh or salt water.

√ know the role of water in many phenomena related to weather (e.g., thunderstorms, snowstorms, flooding, drought).

√ know air is a substance that surrounds us, takes up space, and moves around us as wind.

Nevada Science Standards and Grade Span Benchmarks

Standard 11: *Solar System and Universe*

Students understand that there are many components in the solar system including Earth.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

● know there are more stars than anyone can easily count, but they are not scattered evenly, and they are not all the same in brightness or color.

√ know the solar system includes the Sun, planets, and moons.

● know stars are like the Sun, but they are so far away that they look like points of light.

√ know there are cyclical patterns of observable objects in the solar system.

√ know the patterns of stars in the sky stay the same (e.g., the constellations), although they appear to move across the sky nightly, and different stars can be seen in different seasons.

Nevada Science Standards and Grade Span Benchmarks

Standard 12: *Earth's Composition and Structure*

Students understand that features on the Earth's surface are constantly changed by a combination of slow and rapid processes.

Grades 3 – 5 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know fossils are evidence of past life.
- √ know water, wind, and ice constantly change the Earth's land surface by eroding rock and soil in some places and depositing them in other areas.
- √ know landforms may result from slow processes (e.g. erosion and deposition) and fast processes (e.g. volcanoes, earthquakes, landslides, flood, and human activity).
- √ know rock is composed of different combinations of minerals.
- √ know soil varies from place to place and has both biological and mineral components.

Constructed-Response Items

The constructed-response items present students with a question or questions that require students to respond in written form. Students receive a score of 0-3 points on their answer, with 0 being the lowest and 3 being the highest. A score of 2 or 3 is deemed proficient. For each constructed-response item, an item specific rubric is designed based on the general rubric. (See below for example.)

Score Point	Expectation
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of the answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

5th GRADE SCIENCE

The checklist below is a guide that teachers and students can use to assist them in writing responses to the constructed-response items.

5TH GRADE
CONSTRUCTED-RESPONSE CHECKLIST

As part of the test, you will be asked to answer 3 written-response questions. Read and think about the questions on the checklist to help you do a good job when you are answering the written-response questions.

Did I think about the question (and/or directions) that I read	_____ Yes	_____ No
If the question asks for an explanation, did I tell how I determined my answer?	_____ Yes	_____ No
Did I use the information in any charts or diagrams to help me with answer?	_____ Yes	_____ No
If I used a diagram or graph in my answer, did I label all parts clearly?	_____ Yes	_____ No
Did I complete all parts of the question?	_____ Yes	_____ No

5th GRADE SCIENCE

The matrix below explains the configuration of the fifth grade science examination.

CRT Grade 5 Science Examination Item Matrix					
Content Clusters/ Ability Levels (Cognitive Domains)	**C1** Physical Science	**C2** Life Science	**C3** Earth & Space Science	**C4** Nature of Science	Total Percent
A1 Fundamental Principles	36%	26%	42%	30%	34%
A2 Conceptual Understanding	46%	50%	44%	44%	46%
A3 Practical Reasoning	18%	24%	14%	26%	20%
Total Points	16	16	12	2	100%

5th GRADE SCIENCE

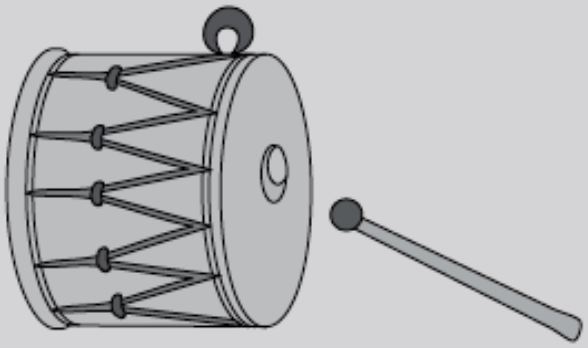
Reporting Category: C2 – Physical Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Investigate and describe how vibrations produce sound.

Test Item:

When the drum is struck with the mallet, sound is produced.



Sound is produced in the drum through

A color changes.

B increased vibrations.

C increased mass.

D temperature decreases.

Correct Answer B: Vibrations produce sound.

Response A: This response is incorrect. Color change is not a characteristic of sound.

Response C: This response is incorrect. Increased mass will not produce sound.

Response D: This response is incorrect. Sensing a temperature change does not affect the sound that is currently being produced.

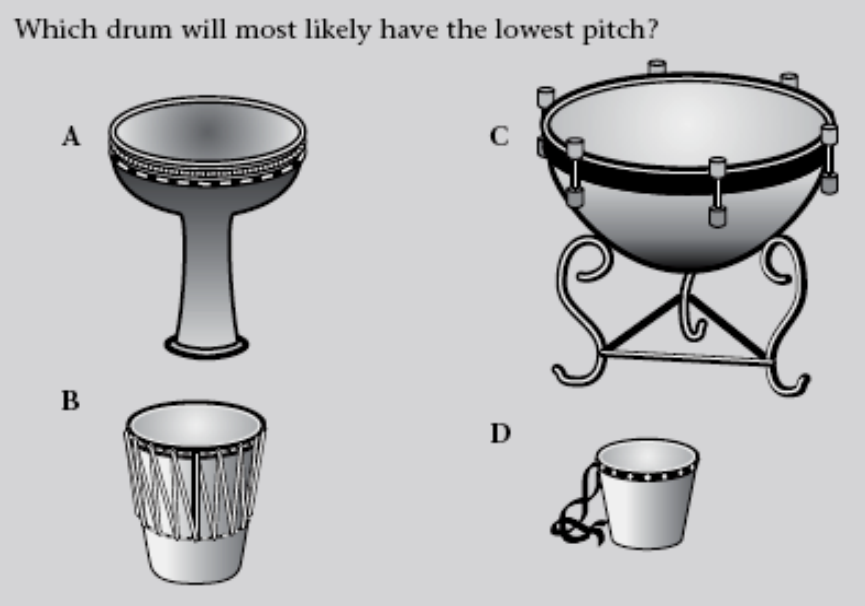
5th GRADE SCIENCE

Reporting Category: C2 – Physical Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Investigate and describe how vibrations produce sound.

Test Item:



Correct Answer B: The large, deep, wide drum will produce the lowest pitch.

Response A: This response is incorrect. A drum with a narrow base will produce a higher pitch.

Response C: This response is incorrect. The body of the drum tapers down. It will produce a higher pitch.

Response D: This response is incorrect. The drum is small in size and narrows at the base. It will produce a very high pitch.

5th GRADE SCIENCE

Reporting Category: C2 – Physical Science

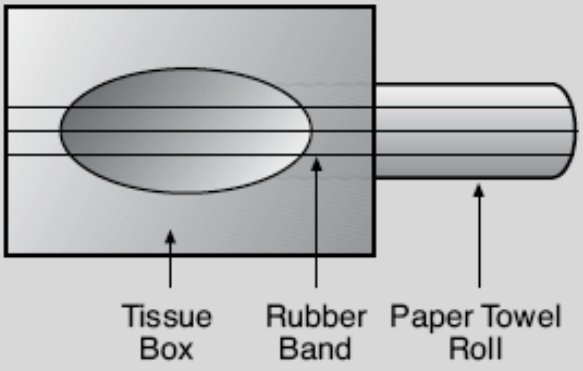
Ability Level: A3 – Practical Reasoning (Open Ended)

Performance Indicator: Investigate and describe how vibrations produce sound.

Test Item:

Write your answer to Question # on page # in your Answer Booklet. Be sure to answer Parts A,B, and C.

A banjo is made from a tissue box, a paper towel roll, and three rubber bands. When the rubber bands are plucked, they produce sounds.



A Explain why the rubber bands make a sound when plucked?

B What can be done to produce lower pitched sounds from the rubber bands?

C What can be done to make the rubber bands produce loud and soft sounds?

Complete and correct response (similar to the following)

Three Key Elements

Part A
One key element
Rubber bands produce sound when plucked because:

Part B
One key element
To produce lower pitched sounds from the rubber bands:

- the paper towel roll could be cut shorter to shorten the length the rubber bands are stretched. Also, the rubber bands could be replaced with longer, thicker ones. This would produce a lower pitched sound. The rubber bands could also be effectively shortened holding the fingers across the bands.

Part C
One key element
To produce loud and soft sounds:

- The rubber bands must be plucked harder to produce a louder sound. The rubber bands must be plucked softer to produce softer sounds.

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/ Misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

5th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Investigate, compare, and contrast the different structures of organisms that serve different functions for growth, reproduction, and survival.

Test Item:

A student walks from the school to the playground on a cold day. Which body structure would be the first to sense a change in air temperature?

A lungs

B skin

C muscles

D hair

Correct Answer B: The skin contains nerves that detect changes to the surrounding environment. These nerves send messages to the brain that receive the messages.

Response A: This response is incorrect. The lungs can indicate a temperature change but will not be the first to do so.

Response C: This response is incorrect. The muscles are not sense organs. They assist in locomotion of the organism.

Response D: This response is incorrect. Hair beyond the follicle is no longer living and cannot sense change.

5th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Investigate, compare, and contrast the different structures of organisms that serve different functions for growth, reproduction, and survival.

Test Item:

Which of the following best describes the function of the human skeletal system?

A It removes needed oxygen from the air.

B It carries oxygen to muscles and vital organs.

C It removes waste products from the body.

D It protects and supports internal structures.

Correct Answer D: The human skeleton supports the weight of the tissues and organs of the body.

Response A: This response is incorrect. Lungs remove the oxygen from the environment.

Response B: This response is incorrect. The circulatory system carries oxygen to the muscles of the body.

Response C: This response is incorrect. The excretory system removes waste products from the body.

5th GRADE SCIENCE

Reporting Category: C3 – Life Science

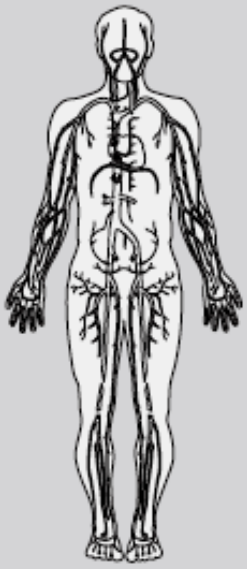
Ability Level: A3 – Practical Reasoning

Performance Indicator: Investigate, compare, and contrast the different structures of organisms that serve different functions for growth, reproduction, and survival.

Test Item:

Write your answer to Question # on page # in your Answer Booklet. Be sure to answer Parts A,B, and C.

The circulatory and immune system work together to keep the body healthy.



A What role does the circulatory system play in keeping the body healthy?

B What role does the immune system play in keeping the body healthy?

C Explain how the circulatory and immune systems work together to keep the body healthy.

Complete and correct response (similar to the following)

Three key elements

Part A
One key element
The role the circulatory system plays in keeping the body healthy:

- The circulatory system carries needed oxygen and nutrients to all parts of the body.

Part B
One key element
The role the immune system plays in keeping the body healthy:

- As the blood circulates through the body, it carries white blood cells and antibodies to all areas of the body to fight infection and disease

Part C
One key element
How the circulatory and immune systems work together to keep the body healthy:

- The circulatory system carries the antibodies and T-cells to the wounds and infected areas to assist in healing and keeping the body healthy.

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

5th GRADE SCIENCE

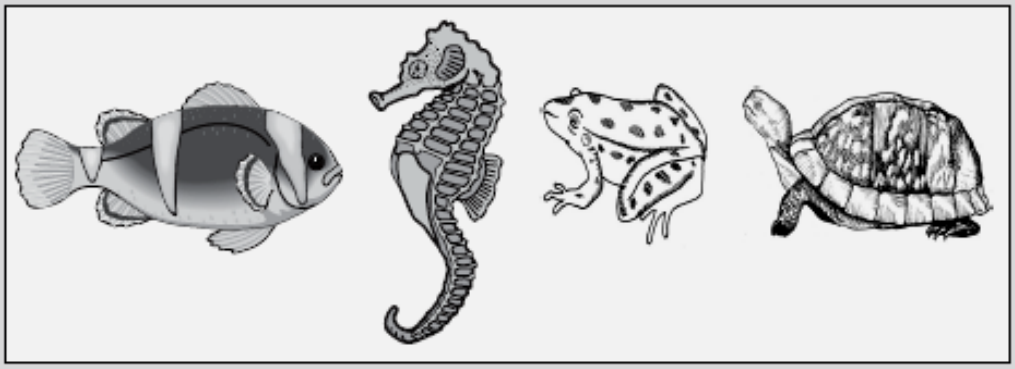
Reporting Category: C3 – Life Science

Ability Level: A1 – Fundamental Understanding

Performance Indicator: Explain how living things may be classified on the basis of similar features, behaviors, and/or habits.

Test Item:

The organisms below have a common characteristic.



Which characteristic can be used to classify these four organisms in the same group?

A having lungs

B having hair

C having backbones

D having feet

Correct Answer C: The organisms can be classified as vertebrates because they all have backbones.

Response A: This response is incorrect. The fish and seahorse have gills that filter oxygen from the water.

Response B: This response is incorrect. None of the organisms have body hair.

Response D: This response is incorrect. The fish and seahorse have appendages but not feet like the frog and turtle.

5th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Explain how living things may be classified on the basis of similar features, behaviors, and/or habits.

Test Item:

A parrot, flamingo and goose have been classified together.

Which of the following characteristics classifies the organisms as birds rather than reptiles?

A They all have skeletons.

B They all have feathers.

C They all use oxygen.

D They all lay eggs.

Correct Answer B: A unique characteristic to all birds is feathers.

Response A: This response is incorrect. Reptiles also have backbones.

Response C: This response is incorrect. Reptiles also use oxygen.

Response D: This response is incorrect. Some reptiles also lay eggs.

5th GRADE SCIENCE

Reporting Category: C3 – Life Science

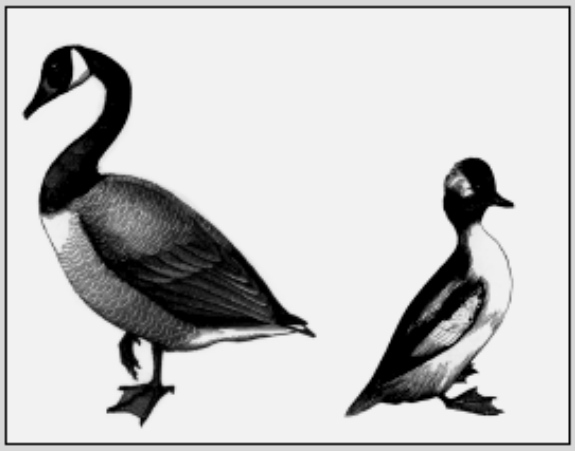
Ability Level: A3 – Practical Reasoning

Performance Indicator: Explain how living things may be classified on the basis of similar features, behaviors, and/or habits.

Test Item:

Write your answer to Question # on page # in your Answer Booklet. Be sure to answer Parts A and B.

The animals below are classified as birds.



A Identify two physical features that the animals above have in common.

B Describe two behaviors the animals have in common.

Complete and correct response (similar to the following)

Four key elements

Part A
Two key elements
Two physical features the animals have in common are including but not limited to:

- they have feathers
- they have beaks
- they have wings
- they have webbed feet
- they have eyes on the side of the head
- they have paired nostrils

Part B
Two key elements
Two behaviors they have in common are including but are not limited to:

- they fly
- they swim
- they lay eggs
- they build nests
- they migrate

Score Point	Description
3	Four key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two or three key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

5th GRADE SCIENCE

Reporting Category: C4 – Earth /Space Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Explain that the surface of the Earth changes due to a variety of factors. Some are abrupt such as volcanoes and earthquakes, and others happen very slowly, such as the wearing down of mountains.

Test Item:

Which of the following natural events will slowly change the shape of a mountain?

A a blowing wind

B a volcanic eruption

C an earthquake

D a landslide

Correct Response A: Over time, the blowing wind can erode the mountain.

Response B: This response is incorrect. A volcanic eruption is a powerful release of pressure that results in major structural change.

Response C: This response is incorrect. An earthquake is a shift in earth plates that results in visible structural change.

Response D: This response is incorrect. A landslide involves a portion of the mountain relocating in a large mass. This would result in a structural change in the mountain.

5th GRADE SCIENCE

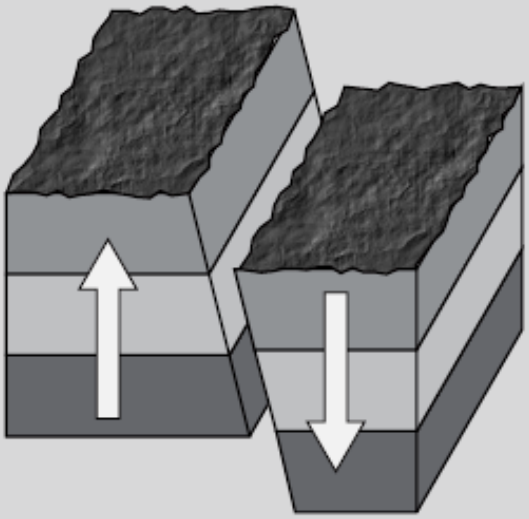
Reporting Category: C4 – Earth /Space Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Explain that the surface of the Earth changes due to a variety of factors. Some are abrupt such as volcanoes and earthquakes, and others happen very slowly, such as the wearing down of mountains.

Test Item:

Natural events occur on our planet every day.



Which natural event most likely caused the change in the rock layers above?

A mudslide

B thunderstorm

C windstorm

D earthquake

Correct Response D: An earthquake is a shift in Earth's plates that can result in a visible fault line.

Response A: This response is incorrect. A mudslide is a dislodging of a mass of earth due to oversaturation from excessive rainfall.

Response B: This response is incorrect. Thunderstorms cause erosion, which is a slow process.

Response C: This response is incorrect. Windstorms cause erosion, which is a slow process.

5th GRADE SCIENCE

Reporting Category: C4 – Earth /Space Science

Ability Level: A3 – Practical Reasoning

Performance Indicator: Explain that the surface of the Earth changes due to a variety of factors. Some are abrupt such as volcanoes and earthquakes, and others happen very slowly, such as the wearing down of mountains.

Test Item:

Write your answer to Question # on page # in your Answer Booklet. Be sure to answer Parts A and B.

The natural structures of Bryce Canyon have changed.

A Describe the length of time it most likely took for the change to occur above.

B Identify and describe two types of erosion that could have changed the shape of the canyon.

Complete and correct response (similar to the following)

Three key elements

Part A
One key element
The length of time for the changes to occur:

- It most likely took hundreds or thousands of years. Erosion of the rock canyon is a slow process.

Part B
Two key elements
Two types of erosion that could have changed the shape of the canyon are:

- Wind erosion. As the wind blows, the rock is slowly broken down. Also, as small particles of rock fall from the rock it can be blown against the existing rock to further erode it away.
- Water erosion will break down the rock as it rains. Also, as water washes down the rock, the grains of rock rub against the existing rock to further break it down.

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

5th GRADE SCIENCE

Reporting Category: C4 – Earth and Space Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Investigate and describe how erosion and deposition rates can be affected by the slope of the land and by human activities.

Test Item:

Which of the following human activities will **most** increase the rate of erosion?

A mowing grass

B trimming trees

C plowing fields

D planting flowers

Correct Answer C: Plowing fields loosens the soil from the roots of plants. The wind and rain will more easily wash it away.

Response A: This response is incorrect. Mowing the grass may expose or loosen soil, but the grass roots will minimize erosion.

Response B: This response is incorrect. Trimming trees may also expose the undergrowth to rain and wind but roots from surrounding plants will minimize erosion.

Response D: This response is incorrect. Planting flowers will reduce the rate of erosion due to the roots of the flowers holding the soil together.

5th GRADE SCIENCE

Reporting Category: C – Earth and Space Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Investigate and describe how erosion and deposition rates can be affected by the slope of the land and by human activities.

Test Item:

Which of the following hillsides will experience the most erosion?

A

C

B

D

Correct Answer A: A hillside with the most soil exposed will experience the most erosion.

Response B: This response is incorrect. The roots of the grass will hold the soil together.

Response C: This response is incorrect. The roots from the trees and grass will hold the soil together.

Response D: This response is incorrect. The roots of the shrubs and grass will hold the soil together, and less erosion will occur.

5th GRADE SCIENCE

Reporting Category: C4 – Earth and Space Science

Ability Level: A3 – Practical Reasoning

Performance Indicator: Investigate and describe how erosion and deposition rates can be affected by the slope of the land and by human activities.

Test Item:

The area below is being deforested.

What effect will weather conditions **most likely** have on the clear-cut forest hillside?

A The rains will help the soil stay muddy, making it harder to wash away.

B The winds will uncover rocks that help keep the soil moist for the uncut trees.

C The winds and rain will speed up how quickly the soil erodes from the area.

D The increased amount of sunlight will help the tree stumps to grow into full-grown trees.

Correct Answer C: As the roots of the cut trees die, the soil will become loose and be washed away by the winds and rains.

Response A: This response is incorrect. Muddy soil on a slope will wash down the hillside.

Response B: This response is incorrect. Rocks do not absorb water or help soil stay moist.

Response D: This response is incorrect. Increased sunlight will dry out the tree stumps.

1 Bats like the one below rest in caves during the day and hunt at night.

Which characteristic would most help a bat search for food?

A small eyes

B big ears

C long wings

D sharp teeth

2 When hydrogen gas and oxygen gas combine they form water. Which term best describes water?

A element

B solution

C compound

D mixture

3 A bear was seen roaming through a neighborhood and knocking over trashcans. Which of the following most likely caused the bear's behavior?

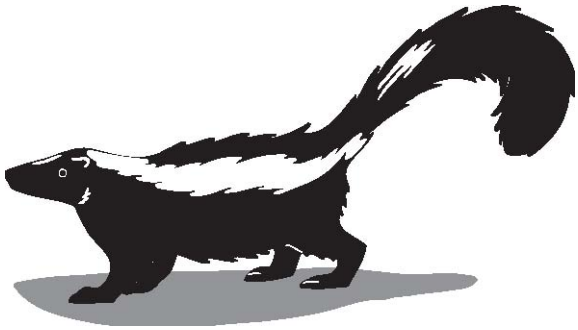
A The bear learned to trust people.

B The bear learned that food was available.

C The bear was avoiding large predators.

D The bear was searching for shelter to hibernate.

4 Skunks have a very powerful odor for self-defense.



One day, a skunk uses this defense against a wolf. The next time the wolf comes upon a skunk the wolf will most likely

A make skunks its favorite food.

B avoid the next skunk it sees.

C attack the skunk from the front.

D continue to follow the skunk.

5 Which of the following behaviors (traits) is learned by a puppy?

A drinking water when thirsty

B panting when hot

C fetching a stick for its master

D wagging its tail

6 Which of the following would make certain an organism would be classified as a plant?

A Its tissues are made of cells.

B Each cell lacks a nucleus.

C Its body contains a skeleton.

D Some cells can photosynthesize.

7 Which of these animals is a reptile?

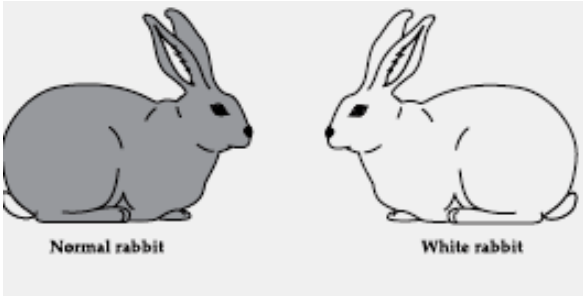
A 

B 

C 

D 

8 The two rabbits below are from the same litter.



In a grassy meadow the normal rabbit will have a better chance of surviving than the white rabbit because it

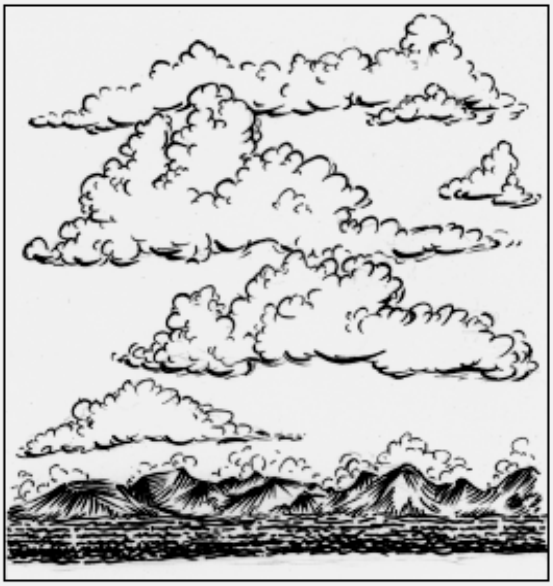
A has a keen sense of smell.

B blends with its environment.

C has a keen sense of hearing.

D keeps cooler in the summer.

9 Several processes are occurring in the picture below.



Which of the following processes forms the cloud?

A precipitation

B evaporation

C condensation

D reproduction

10 Which of the following would cause a metal pot of water to boil more quickly?

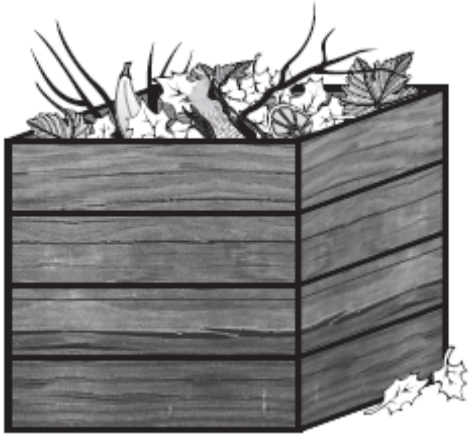
A placing the pot under the midday sun

B holding the pot over an open flame

C stirring the water in the pot with a spoon

D rubbing sandpaper against the pot

11 This compost pile is filled with rotting leaves, branches and kitchen scraps. It will someday be added to a garden.



How do the rotting materials help a garden ecosystem?

A They provide nutrients to the soil.

B They provide shade for young trees.

C They produce light energy for seeds.

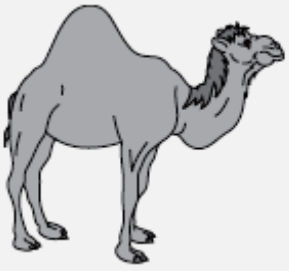
D They produce water for the water cycle.

12 Which of the following animals would survive best in a desert environment?

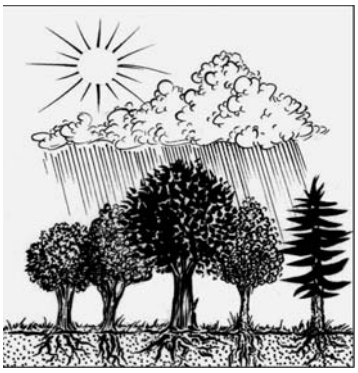
A 

B 

C 

D 

13 Ecosystems require energy to survive.



What is the main energy source of the ecosystem above?

A soil

B trees

C rain

D sun

14 A change to the environment below has occurred.

Which of the following most likely explains the change to the environment above?

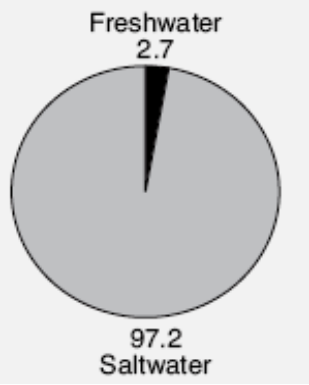
A Strong winds uprooted the taller trees in the forest.

B Wood-eating insects destroyed the older trees.

C Trees were cut down to use as building materials.

D Flood waters washed away trees growing in loose soil.

15 The graph below shows the percentages of water on Earth.



Which of following best explains the data provided in the graph?

A The planet is running out of water.

B Most of the planet's water is salty.

C Saltwater affects Earth negatively.

D Freshwater is difficult to locate.

16 Energy is needed to set the bicycle in motion.

Which of the following shows the correct order of energy transfer for the bike to move?

A rider → chain → pedals → wheels

B rider → pedals → chain → wheels

C wheels → chain → pedals → rider

D wheels → pedals → chain → rider

17 According to a researcher's data, cheetahs can run up to 72 miles per hour. What else should be done to make sure data are correct?

A Collect data from young cheetahs.

B Collect data while cheetahs are feeding.

C Collect data while cheetahs are resting.

D Collect data from several cheetahs.

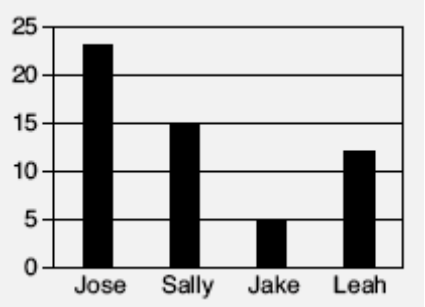
18 Students performed an experiment to determine which boat design could hold the most pennies before sinking.

Boat Design Results

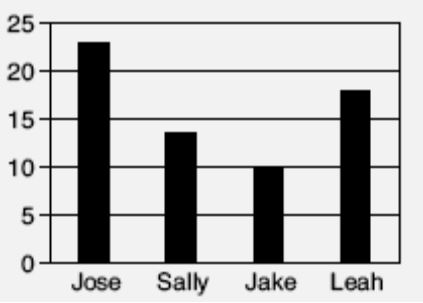
Student	Number of pennies without sinking
Jose	23
Sally	13
Jake	10
Leah	18

Which graph shows the correct information above?

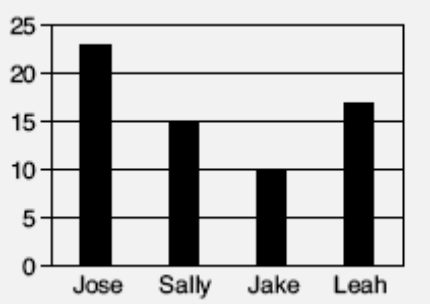
A



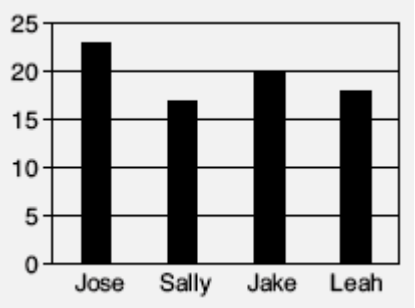
C



B

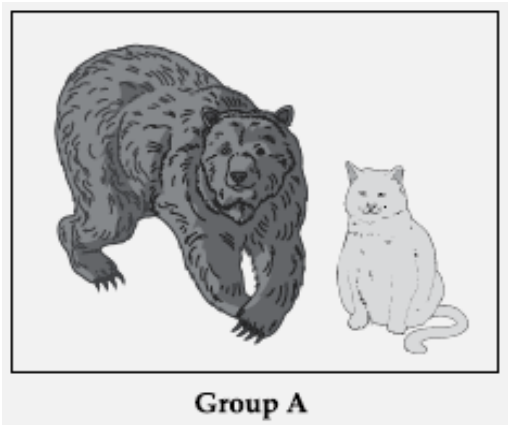


D

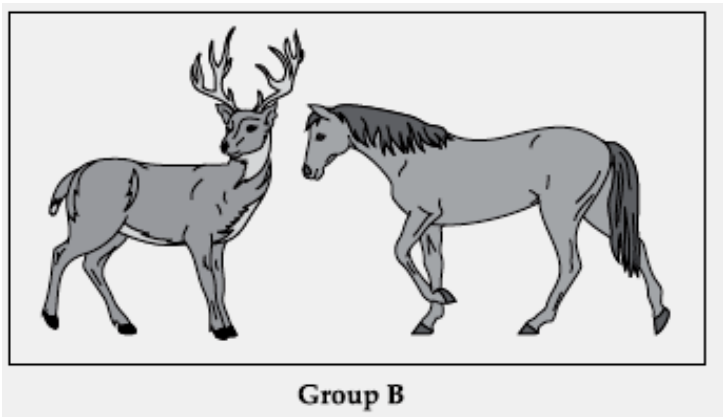


Write your answer to Question 19 on page 6 in your Answer Booklet. Be sure to answer Parts A and B.

19 The animals below have common characteristics.



Group A



Group B

A Describe two features that allow animals in groups A and B to be classified together.

B Describe one characteristic that prevents the groups of animals from being classified together.

Write your answer to Question 20 on page 6 in your Answer Booklet. Be sure to answer Parts A and B.

20 Both rainforests and deserts provide homes to many living things.

A Which of the two environments most likely provides a home to the greatest number of living things? Explain your answer.

B Explain why animals would prefer one environment over another on a hot summer day.

5th Grade SCIENCE KEY: SAMPLE TEST QUESTIONS

Item Number	Reporting Category	Ability Level	Answer Key
1	C2	A1	B
2	C1	A2	C
3	C2	A2	B
4	C2	A2	B
5	C2	A1	C
6	C2	A1	D
7	C2	A2	B
8	C2	A2	B
9	C3	A2	C
10	C3	A1	B
11	C2	A2	A
12	C2	A2	D
13	C3	A2	D
14	C3	A1	C
15	C4	A2	B
16	C4	A2	B
17	C4	A1	D
18	C4	A1	C
19	CR-C2	A3	*
20	CR-C2	A3	*

* Indicates a constructed-response item. See the following page for the rubric and sample response.

Rubric for Question 19:

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

Three key elements

Part A
Two key elements

Two features that allow the animals to be classified together are:

- they have body hair
- they have live births
- they have backbones
- they breathe oxygen
- they are warm blooded

Part B
One key element

A characteristic that prevents the groups from being classified together:

- Includes but is not limited to, group B have hooves, group B are herbivores, group B are prey, group A are predators.

Rubric for Question 20:

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

Three key elements

Part A
Two key elements

The environment that provides a home to the greatest number of living things:

- rainforest

Explanation:

- Because it offers the best conditions for living things to survive. Water, sun and food are more accessible.

Part B
One key element

Explain why an animal would prefer one environment over another on a hot summer day:

- The animals would likely choose to live in the rainforest because the trees can create shade from the sun. Shade usually results in cooler temperatures than out in the open. Rainforests also have plenty of water to drink when it is needed.

8th GRADE SCIENCE

An overview of the Criterion Referenced Test program is provided at the beginning of this review guide. Information about the purpose, rationale & philosophy, accountability & alignment, development, and reporting can answer questions to the broader details of the program.

The materials that follow include the performance standards for grade 8, the matrix of the test configuration, and examples of test items. A number of test items include explanations for the correct answer and distracters of each test item. It is important to note that the following examples are examples. They are not intended to establish limits of what will be on the test or limits to the ways the standards can be assessed.

Content standards 1 through 12 deal with students' abilities to understand and use science concepts. Listed below the content standards are the grade span benchmarks. The following is a description of the standards and those benchmarks tested. Those tested at the state level are check marked.

Nevada Science Standards and Grade Span Benchmarks

Standard 1: *Scientific Inquiry*

Students understand that scientific knowledge requires critical consideration of verifiable evidence obtained from inquiry and appropriate investigations.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

√ know how to identify and critically evaluate information in data, tables, and graphs.

√ know how to critically evaluate information to distinguish between fact and opinion.

√ know different explanations can be given for the same evidence.

- know how to design and conduct a controlled experiment.

- know how to use appropriate technology and laboratory procedures safely for observing, measuring, recording, and analyzing data.

√ know scientific inquiry includes evaluating result sof scientific investigations, experiments, observations, theoretical and mathematical models, and explanations proposed by other scientists.

√ know there are multiple methods for organizing items and information.

8th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 2: *Science, Technology, and Society*

Students understand the interactions of science and society in an ever-changing world.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

√ understand that consequences of technologies can cause resource depletion and environmental degradation, but technology can also increase resource availability, mitigate environmental degradation, and make new resources economical.

√ know scientific knowledge is revised through a process of incorporating new evidence gained through on-going investigation and collaborative discussion.

Nevada Science Standards and Grade Span Benchmarks

Standard 3: *Matter*

Students understand the properties and changes of properties in matter.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

√ know particles are arranged differently in solids, liquids, and gases of the same substance.

√ know elements can be arranged in the periodic table which shows repeating patterns that group elements with similar properties.

√ know methods for separating mixtures based on the properties of the components.

√ know atoms often combine to form molecules, and that compounds form when two or more different kinds of atoms chemically bond.

√ know mass is conserved in physical and chemical changes.

√ know matter is made up of tiny particles called atoms.

√ know the characteristics of electrons, protons, and neutrons.

√ know substances containing only one kind of atom are elements which cannot be broken into smaller pieces by normal laboratory processes.

8th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 4: *Forces and Motion*

Students understand that position and motion of an object result from the net effect of the different forces acting on it.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know the effects of balanced and unbalanced forces on an object's motion.
- √ electric currents can produce magnetic formces and magnets can cause electric currents.
- √ know every object exerts gravitational force on every other object, and the magnitude of this force depends on the mass of the objects and their distance from one another.

Nevada Science Standards and Grade Span Benchmarks

Standard 5: *Energy*

Students understand transfer of energy.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know visible light is a narrow band within the electromagnetic spectrum.
- √ know vibrations (e.g. sounds, earthquakes) move at different speeds in different materials, have different wavelengths, and set up wave-like disturbances that spread away from the source uniformly.
- √ know physical, chemical, and nuclear changes involve a transfer of energy.
- √ know energy cannot be created or destroyed, in a chemical or physical reaction, but only changed from one form to another.
- √ know heat energy flows from warmer materials or regions to cooler ones through conduction, convection, and radiation.
- √ know electrical circuits provide a means of transferring electrical energy to produce heat, light, sound, and chemical changes.

8th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 6: *Heredity*

Students understand the role of genetic information in the continuation of a species.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know heredity is the passage of genetic instructions from one generation to the next generation.
- √ know changes in genes of eggs and sperm can cause changes in inherited characteristics.
- ● know organisms can be bred for specific characteristics.
- √ know some characteristics of an organism are the result of a combination of interaction with the environment and genetic information.

Nevada Science Standards and Grade Span Benchmarks

Standard 7: *Structure of Life*

Students understand that living things are composed of cells, which are specialized in multicellular organisms to perform a variety of life functions.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know all organisms are composed of cells, which are the fundamental units of life
- √ know cells grow, divide, and take in nutrients which they use to provide energy for cell functions.
- √ know some organisms are made of just one cell and that multicellular organisms can consist of thousands to millions of cells working together.
- √ know disease can result from defects in body systems or from damage caused by infection.

8th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 8: *Organisms and Their Environment*

Students understand how living and nonliving components of ecosystems interact.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know how matter and energy are transferred through food webs in an ecosystem.
- √ know how to characterize organisms in any ecosystem by their functions.
- √ will evaluate how changes in environments can be beneficial or harmful.
- √ know all organisms, including humans, can cause changes in their environments.
- √ know inter-related factors affect the number and type of organisms an ecosystem can support.

Nevada Science Standards and Grade Span Benchmarks

Standard 9: *Diversity of Life*

Students understand that life forms change over time, contributing to the variety of organisms found on the Earth.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know species can be identified and classified based upon their characteristics.
- √ know changes in genes of eggs and sperm can cause changes in inherited characteristics.
- √ know fossils provide evidence of how life and environmental conditions have changed throughout geologic time.
- √ know an organism's behavior is based on both experience and on the species' evolutionary history.

8th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 10: *Atmospheric Processes and the Water Cycle*

Students understand the relationship between the Earth's atmosphere, topography, weather, and climate.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

√ know seasons are caused by variations in the amounts of the Sun's energy reaching Earth's surface due to the planet's axial tilt.

√ know how the processes involved in the water cycle affect climatic patterns.

√ know the properties that make water an essential component of the earth system.

√ understand the composition of earth's atmosphere, emphasizing the role of the atmosphere in Earth's weather and climate.

√ know the difference between local weather and regional climate.

√ know topography and patterns of global and local atmospheric movement influence local weather which occurs primarily in the lower atmosphere.

Nevada Science Standards and Grade Span Benchmarks

Standard 11: *Solar System and Universe*

Students understand characteristics of our solar system that is part of the Milky Way galaxy.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

● know the universe contains many billions of galaxies, and each galaxy contains many billions of stars.

√ know the solar system includes a great variety of planetary moons, asteroids, and comets.

√ know characteristics of the planets in our solar system.

√ know Earth is part of a solar system located within the Milky Way Galaxy.

● know the Sun is many thousands of times closer to Earth than any other star, and billions of times closer than the far end of the Milky Way Galaxy.

√ know the Sun is a medium-sized star located in the Milky Way Galaxy, part of which can be seen as a glowing band of light spanning the clear night sky.

√ know regular and predictable motions of Earth around the Sun and the Moon around the Earth explain such phenomena as the day, the year, phases of the Moon, and eclipses.

8th GRADE SCIENCE

Nevada Science Standards and Grade Span Benchmarks

Standard 12: *Earth's Composition and Structure*

Students understand that landforms result from a combination of constructive and destructive processes.

Grades 6 – 8 Benchmarks

By the end of the grade band, students know and are able to do everything required in earlier grades and:

- √ know sedimentary rocks and fossils provide evidence for changing environments and the constancy of geologic processes.
- √ know rocks at Earth's surface weather, forming sediments that are buried, then compacted, heated and often recrystallized into new rock.
- √ know Earth is composed of a crust (both continental and oceanic); hot convecting mantle; and dense, a metallic core.
- √ know the very slow movement of large crustal plates result in geological events.
- √ know how geologic processes account for state and regional topography.
- √ know minerals have different properties and different distributions according to how they form.
- √ know the characteristics, abundances, and location of renewable and nonrenewable resources found in Nevada.
- √ know soils have properties, such as color, texture, and water retention, and provide nutrients for life according to how they form.

Constructed-Response Items

The constructed-response items present students with a question or questions that require students to respond in written form. Students receive a score of 0-3 points on their answer, with 0 being the lowest and 3 being the highest. A score of 2 or 3 is deemed proficient. For each constructed-response item, an item specific rubric is designed based on the general rubric. (See below for example.)

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of the answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

8th GRADE SCIENCE

The rubric guide below is a tool that teachers and students can use to assist them in writing responses to the constructed-response items.

8TH GRADE CONSTRUCTED-RESPONSE ITEMS
RUBRIC GUIDE

As part of the test, you will be asked to answer written-response questions. Read and think about the following questions to help you do a good job when you are answering the written-response questions.

SCORE POINT	EXPECTATION
Full Credit	• Your response addresses all parts of the question clearly and correctly. • Your response does not include any incorrect information.
Partial Credit	• Your response addresses all parts of the question. • Your response includes only minor errors.
Minimal Credit	• Your response does not address all parts of the question. OR • Your response addresses all parts of the question, but it includes major errors.
No Credit	• Your response is incorrect.

8th GRADE SCIENCE

The matrix below explains the configuration of the eighth grade science examination.

CRT Grade 8 Science Examination Item Matrix					
Content Clusters/ Ability Levels (Cognitive Domains)	**C1** Physical Science	**C2** Life Science	**C3** Earth & Space Science	**C4** Nature of Science	Total Percent
A1 Fundamental Principles	39%	30%	40%	31%	35%
A2 Conceptual Understanding	43%	44%	44%	51%	46%
A3 Practical Reasoning	18%	26%	16%	18%	19%
Total Points	16	14	16	13	100%

8th GRADE SCIENCE

Reporting Category: C2 – Physical Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Describe the force (gravity) that makes objects fall and planets move in their orbits.

Test Item:

Which of the following is a force of attraction between all objects of the universe?

A mass

B inertia

C gravity

D friction

Correct Response C: Gravity is the attraction between all objects in the universe.

Response A: This response is incorrect. Mass is the amount of matter an object has. Mass does have a relation to gravitational pull but all matter, regardless of its position to another object, has mass.

Response B: This response is incorrect. Inertia is a force that applies to the resistance to change of motion.

Response D: This response is incorrect: Friction is a resistance to motion and has no relevance to gravity.

8th GRADE SCIENCE

Reporting Category: C2 – Physical Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Describe the force (gravity) that makes objects fall and planets move in their orbits.

Test Item:

A volleyball player prepares to serve a ball during a match.

Which of the following best explains why the ball falls back down toward the player?

A the attractive force between the ball and player

B the surrounding air pressure acting on the ball

C the force of gravity acting on the player

D the force of gravity acting on the ball

Correct Response D: Gravitational attraction between the planet and the ball. This force pulls the ball to the ground.

Response A: This response is incorrect. The player did exert a force to push the ball into the air, but it was gravity that pulled the ball back down.

Response B: This response is incorrect. Air pressure is exerted onto the ball but from all directions. This pressure would be spread over the entire surface of the ball and would not force the ball to the ground.

Response C This response is incorrect. Gravity does act on the player but this force has no relevance to the ball being pulled back down.

8th GRADE SCIENCE

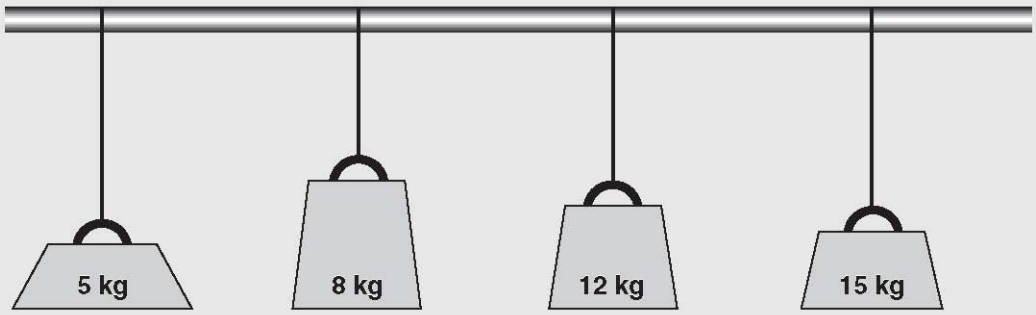
Reporting Category: C2 – Physical Science

Ability Level: A3 – Practical Reasoning

Performance Indicator: Describe the force (gravity) which makes objects fall and planets move in their orbits.

Test Item:

All four weights are suspended eight feet above the ground.



A Which weight will have the greatest gravitational attraction?

B If all four weights were released at the same time, what would be the result?

C What other factor could influence the rate at which the weights fall?

Complete and Correct Response (similar to the following)

Three key elements

Part A

One key element:
- The 15 kg has the greatest mass of the four weights, giving it the greatest gravitational attraction.

Part B

One key element:
- The weights would all touch the ground at the same time.

Part C

One key element:
Any of the factors that could influence the rate the weights fall are
- wind resistance
- air pressure
- shape of the weights
- human error

8th Grade SCIENCE SAMPLE SCORING RUBRIC

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

8th GRADE SCIENCE

Reporting Category: C2 – Physical Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Investigate and describe that certain physical principles are used in the design and function of simple machines.

Test Item:

Which simple machine is designed to lift heavy objects?

A

C

B

D

Correct Response C: The pulley is designed to make work easier when lifting heavy objects.

Response A: This response is incorrect. The screwdriver is designed to apply force in a twisting motion.

Response B: This response is incorrect. The mallet is designed to apply force in a downward motion.

Response D: This response is incorrect. The pliers are designed to grasp or hold an object.

8th GRADE SCIENCE

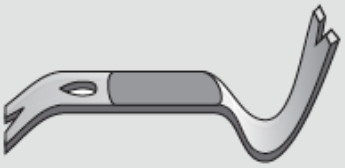
Reporting Category: C2 – Physical Science

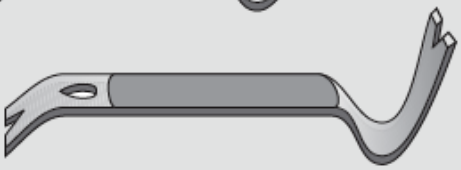
Ability Level: A2 – Conceptual Understanding

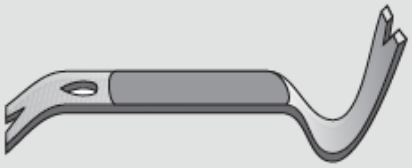
Performance Indicator: Investigate and describe that certain physical principles are used in the design and function of simple machines.

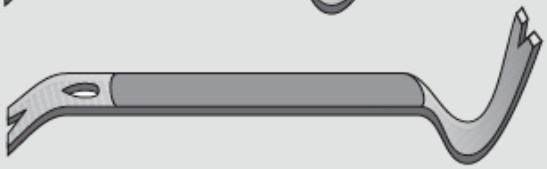
Test Item:

Which of the following crowbars would most likely require the least amount of force to pull out a nail from a board.

A 

B 

C 

D 

Correct Response D: The crowbar with the longest lever will require the least amount of force exerted to remove the nail.

Response A: This response is incorrect. The shortest lever will require the most force to be exerted on the handle to remove the nail.

Response B: This response is incorrect. Shorter levers require more force to be exerted on the handle to remove the nail.

Response C: This response is incorrect. Shorter levers require more force to be exerted on the handle to remove the nail.

8th GRADE SCIENCE

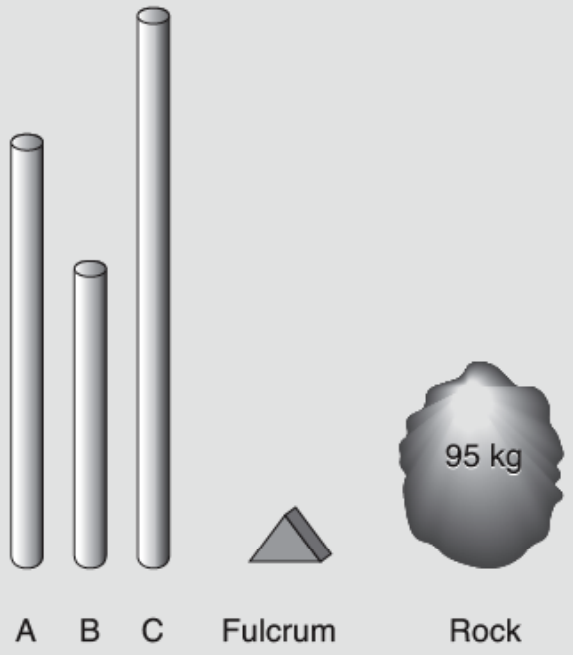
Reporting Category: C2 – Physical Science

Ability Level: A3 – Practical Reasoning

Performance Indicator: Investigate and describe that certain physical principles are used in the design and function of simple machines.

Test Item:

A large rock needs to be moved using a long metal bar.



A Using the materials above, draw a procedure you would follow to move the rock using the least amount of force.

B How can the position of the fulcrum affect the work of moving the rock?

C Except for the rock, what changes should be made to the materials to make the work of moving the rock easier?

Complete and Correct Response (similar to the following)

Key elements

Part A

Two key elements:
- Diagram showing bar C wedged under the rock.
- Diagram showing the fulcrum position being under bar C and close to the rock.

Part B

One key element:
- The fulcrum should be placed closely to the rock to make the work easier. The further away the fulcrum is from the rock, the more force is needed to move it.

Part C

One key element:
Any of the following factors:
- The fulcrum needs to be larger.
- C metal bar could be longer.
- Add more C metal bars under the rock.

Score Point	Description
3	Four key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two or three key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

8th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Investigate and describe how multicellular living things have tissues, organs and organ systems that are specialized to perform life functions.

Test Item:

Which of the following organ systems is responsible for a species making more of the same species?

A reproductive system

B circulatory system

C digestive system

D skeletal system

Correct Response A: The reproductive system is responsible for the production of sperm and egg cells. When fertilization occurs, an offspring is produced and the next generation of a species is produced.

Response B: This response is incorrect. The circulatory system carries needed oxygen throughout the body.

Response C This response is incorrect. The digestive system is responsible for the breakdown of nutrients that are consumed by the organism.

Response D: This response is incorrect. The skeletal system is designed to support and protect the internal structures of the organism.

8th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Investigate and describe how multicellular living things have tissues, organs and organ systems that are specialized to perform life functions.

Test Item:

A multicellular organism, like human, is made up of like cells that combine to form like tissues. When like tissues combine, they form like

A animals.

B organs.

C specialized cells.

D organ systems.

Correct Response B: Like cells form like organs. According to the levels of organization pyramid, complex living systems can be broken down into molecular components.

Response A: This response is incorrect. Several levels of organization have been omitted. Like tissues do not form like animals. An animal is an organism, and organ systems working together form an organism.

Response C: This response is incorrect. Like tissues do not regress in complexity and form specialized cells. Cells are less complex than tissues.

Response D: This response is incorrect. Like tissues do not form organ systems. The presence of an organ is necessary to form an organ system.

8th GRADE SCIENCE

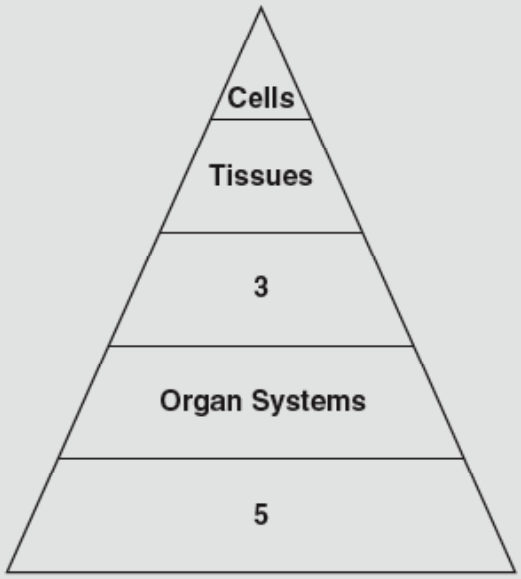
Reporting Category: C3 – Life Science

Ability Level: A3 – Practical Reasoning

Performance Indicator: Investigate and describe how multicellular living things have tissues, organs and organ systems that are specialized to perform life functions.

Test Item:

The levels of organization are shown below with some information missing from the pyramid.



A What term belongs in position 3 of the pyramid? Explain.

B Which term belongs in position 5 of the pyramid? Explain.

C Based on your knowledge of the levels of organization, give a brief explanation of the design of the pyramid.

Complete and correct response (similar to the following)

Five key elements

Part A

Two key elements:
The term that applies to position three:
- Organs

Explanation:
- When tissues with the same function work together with other tissues of the same function an organ is formed.

Part B

Two key elements:
The term that belongs in position five:
- Organism

Explanation:
- When the different systems work together, a functioning organism is formed.

Part C

One key element:
An explanation to the design of the pyramid:
- It's designed to show how each level creates the next level. It shows the interconnection between each level.

Score Point	Description
3	Five key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Three to four key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One or two key elements. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

8th GRADE SCIENCE

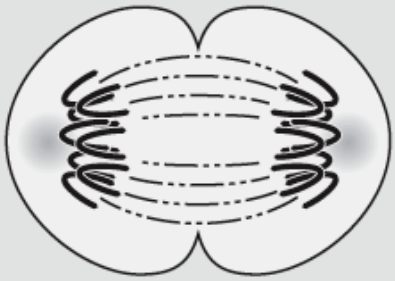
Reporting Category: C3 – Life Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Investigate and describe how cells grow, divide, and take in nutrients, which they use to provide energy for cellular functions.

Test Item:

The cell below is in the telophase stage.



The cell is in the process of performing a specific reproductive function. It is most likely preparing to

A grow.

B divide.

C digest.

D excrete.

Correct Response B: Telophase is a stage of mitosis, a reproductive process of cells, that results in the even division of a cell.

Response A: This response is incorrect. The cell does not grow during the event of telophase. Its physical make up does not increase.

Response C: This response is incorrect. Digestion is the process of breaking down food to get nutrients.

Response D: This response is incorrect. Excretion is the removal of waste products.

8th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Investigate and describe how cells grow, divide, and take in nutrients, which they use to provide energy for cellular functions.

Test Item:

Which of the following is produced by the plant cells when converting the sun's energy?

A fats

B proteins

C sugars

D water

Correct Response C: Plant cells convert the sun's energy into sugars that are broken down for energy.

Response A: This response is incorrect. Fats are a source of energy but are not produced by plant cells as an energy source.

Response B: This response is incorrect. Proteins are a source of energy but are not produced by plant cells for use in their own cellular activities.

Response D: This response is incorrect. Water is necessary for life, but water is absorbed by cells, not produced.

8th GRADE SCIENCE

Reporting Category: C3 – Life Science

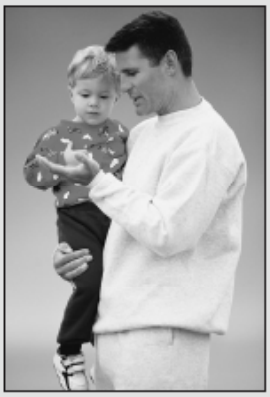
Ability Level: A3 – Practical Reasoning

Performance Indicator: Investigate and describe how cells grow, divide, and take in nutrients, which they use to provide energy for cellular functions.

Test Item:

Write your answer to Question # on Page # in your Answer Booklet. Be sure to answer Parts A, B, and C.

Father and son both contain cells.



A How are the number of cells different between the father and son?

B Which life process is responsible for the creation of more cells?

C Explain the importance of the life process in part B.

Complete and Correct response (similar to the following)

Key elements

Part A

One key element:
- The father will have a greater number of cells than the son since he is older and has had more time for cells to reproduce.

Part B

One key element:
- The reproductive process is responsible for creating more cells through cell division.

Part C

One key element:
- Reproduction of cells assists several processes that aid in the survival of the organism such as growth, development, healing, and maintenance.

8th Grade SCIENCE SAMPLE SCORING RUBRIC

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

8th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Explain how behavior may be innate or learned.

Test Item:

Which of following is a learned behavior?

A cat meowing

B fish swimming

C bird stretching its wings

D dog playing dead

Correct Answer D: The dog must be taught to play dead.

Response A: This response is incorrect. Kittens are born with the ability to meow.

Response B: This response is incorrect. Fish are born with the ability to swim.

Response C: This response is incorrect. Birds are born with the ability to stretch their wings.

8th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Explain how behavior may be innate or learned.

Test Item:

A newly hatched alligator is able to swim at birth. It's able to swim because it

A learned to swim while in the egg.

B watched other alligators swimming.

C was trained by its mother.

D was born with the ability to swim.

Correct Answer D: Innate behaviors are those behaviors the animal is born with.

Response A: This response is incorrect. The developing alligator's egg environment is not similar to a pond or a river, but there are other animals hatched from eggs that cannot swim at birth such as robins or sparrows.

Response B: This response is incorrect. Baby alligators immediately enter the water at birth. Other large alligators are predators that baby alligators would avoid.

Response C: This response is incorrect. Mother alligators protect their young but do not train them.

8th GRADE SCIENCE

Reporting Category: C3 – Life Science

Ability Level: A3 – Practical Reasoning (open ended)

Performance Indicator: Explain how behavior may be innate or learned.

Test Item:

Write your answer to Question # on Page # in your Answer Booklet. Be sure to answer Parts A and B.

A Explain why a dog must be taught to fetch a newspaper.

B Identify and explain two behaviors that are instinctive for a dog.

Complete and correct response (similar to the following)

Key elements

Part A

One key element:
A dog must be taught to fetch a newspaper because:
- The dog is not born knowing how to fetch a stick. It needs to be taught by giving it treats or a pat on the head.

Part B

Two key elements:
Identify two behaviors that are instinctive:
- drinking
- wagging its tail
- barking
- standing
- eating

Explain the behaviors
- The dog is born with the abilities listed above. They do not need to be taught to the dog.

8th Grade SCIENCE SAMPLE SCORING RUBRIC

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

8th GRADE SCIENCE

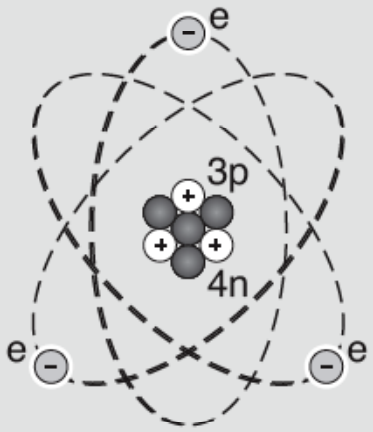
Reporting Category: C2 – Physical Science

Ability Level: A1 – Fundamental Principles

Performance Indicator: Explain that all atoms are made of protons, neutrons, and electrons.

Test Item:

An arrangement of protons, neutrons, and electrons is shown below.



Which term best describes the structure above?

A cell

B atom

C compound

D mixture

Correct Response B: The arrangement of particles represents an atom.

Response A: This response is incorrect. Cells can contain atoms, however, organelles must be present for the arrangement to represent a cell.

Response C: This response is incorrect. A compound is made of two or more elements. Only one element is shown in the picture above.

Response D: This response is incorrect. A mixture is a blend of two or more kinds of matter.

8th GRADE SCIENCE

Reporting Category: C2 – Physical Science

Ability Level: A2 – Conceptual Understanding

Performance Indicator: Explain that all atoms are made of protons, neutrons, and electrons.

Test Item:

An electron is a negatively charged particle. It can be found in which of the following?

A protons

B atoms

C nuclei

D neutron

Correct Response B: Atoms contain negatively charged particles called electrons.

Response A: This response is incorrect. Positively charged protons are found within the atom. Protons do not contain electrons.

Response C: This response is incorrect. Nuclei only contain protons and neutrons.

Response D: This response is incorrect. Neutrons are found within the nucleus of the atom. Neutrons do not contain electrons.

8th GRADE SCIENCE

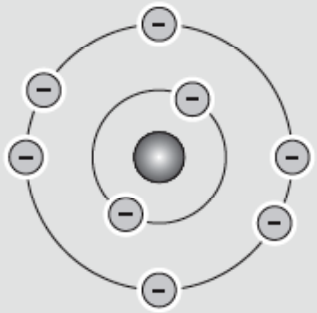
Reporting Category: C2 – Physical Science

Ability Level: A3 – Practical Reasoning

Performance Indicator: Explain that all atoms are made of protons, neutrons, and electrons.

Test Item:

Oxygen is a common element found in our atmosphere.



A Identify the type of structure shown in the picture above.

B Identify the three particles that make up the above structure and the charges they carry.

Complete and correct response (similar to the following)

Key elements

Part A

One key element:
The type of structure is identified as:
- an atom

Part B

Three key elements:
The particles of the atom are identified along with their charges:
- Electrons, they have a negative charge.
- Protons, they have a positive charge.
- Neutrons, they have no charge.

8th Grade SCIENCE SAMPLE SCORING RUBRIC

Score Point	Description
3	Four key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two or three key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

1 Organisms may be classified as a species if they

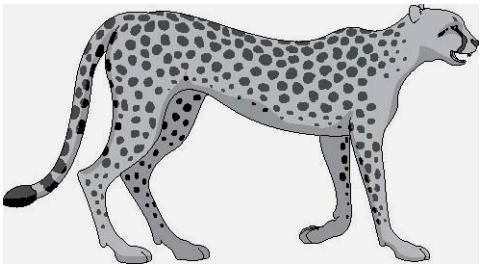
A mate and produce fertile offspring.

B are similar in physical structure.

C adapt to environmental changes.

D have similar life cycles.

2 Cheetahs have a body design adapted to a particular environment.



Which environment would the cheetah experience the most success as a hunter?

A steep mountains
B muddy swamps
C open grasslands
D dense rainforests

3 The discovery of giant ground sloth fossils provides evidence that the environment was once covered by

A tall, dense forests.

B snow and glaciers.

C dry, windy deserts.

D swamps and marshes.

4 The main energy source responsible for t ides on Earth is the

A wind.

B moon.

C sun.

D water.

5 Producers take the sun's energy and convert it into

A heat energy.

B chemical energy.

C solar energy.

D electrical energy.

6 The data below was collected by two different classes. They wanted to compare temperature ranges during the school year.

CLASS A		CLASS B	
Date	Temperature (in degrees C)	Date	Temperature (in degrees C)
10/02	85	12/02	54
10/06	83	12/11	57
10/15	78	12/15	47
10/22	79	12/21	44
11/01	75	01/04	48
11/08	68	01/07	46
11/11	65	01/08	37
11/16	60	01/14	22
11/27	60	01/28	45

Which of the following is the correct temperature range difference between the classes?

A 10

B 12

C 20

D 22

7 An entomologist must measure the wingspan of this butterfly to collect data on its growth rate.

Which of the following lengths of measurement should be used?

A meters

B kilometers

C yards

D centimeters

8 A ruler should be used in an experiment to

A stir a prepared solution.

B filter solids from a mixture.

C remove a specimen from a jar.

D measure the length of a specimen.

9 According to the Periodic Table, which of the following elements will have the properties of a gas?

A carbon

B boron

C neon

D sodium

10 The rotation of a windmill best represents which type of energy?

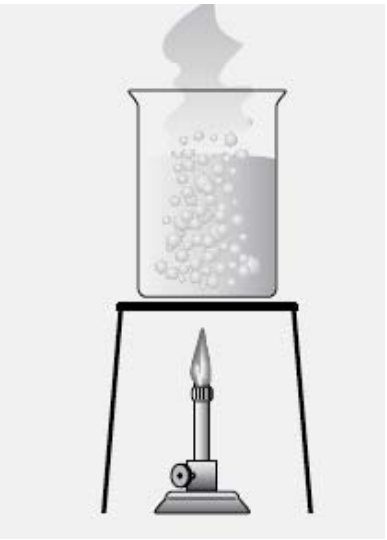
A potential

B kinetic

C thermal

D electrical

11 A beaker of water is heated to produce water vapor.



The process that transfers heat in water vapor is called

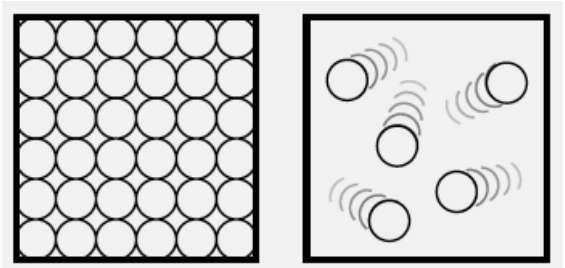
A conduction.

B convection.

C radiation.

D condensation.

12 The particles below represent phase changes in matter from a solid to a gas.



What also needs to happen for these changes to occur?

A Water needs to be added to the matter.

B Changes in energy are required.

C The amount of matter needs to be increased.

D Water needs to be removed from the matter.

13 Which of the following is a virus that can cause a disease?

A green algae

B lichens

C tapeworms

D polio

14 Cellular functions are guided by DNA, which contains

A information.

B carbon dioxide.

C oxygen.

D light energy.

15 Which molecule **best** shows how one carbon atom will bond with four hydrogen atoms?

A
```
H–H–C–H–H
```

B
```
    H
H–C–H
    H
```

C
```
C–H–H–H–H
```

D
```
    H–H
    C
H–H
```

16 Cacti have developed many special traits to aid in survival. The thorns of a cactus are actually its modified leaves. Which other trait has helped the cactus survive its desert environment?

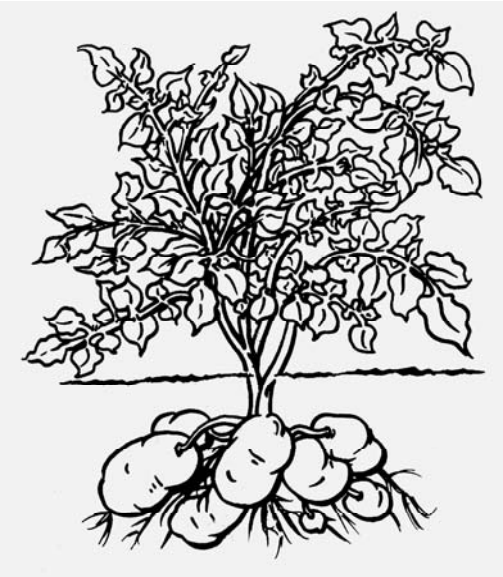
A thick bark to protect the plant from water loss

B green pigment that reflects all the sun's rays

C small roots systems that limit water absorption

D cells with large vacuoles that store water

17 Examine the physical characteristics of the potato plant below.



Which plant structure has become specialized in water storage?

A roots

B stems

C leaves

D flowers

18 The resistance of an object to change its motion is

A inertia.

B gravity.

C acceleration.

D velocity.

19 When bacteria infect a host and reproduce in large numbers, the toxins they release can result in the organism's death. The death of the organism is most likely the result of

A a weakened immune system.

B poor circulation to the brain.

C low oxygen levels in the muscles.

D low numbers of reproductive cells.

20 A palm leaf fossil was discovered in a desert environment. Which of the following most likely explains this observation?

A The fossil was relocated due to shifting faults in the area.

B The fossil was carried downstream by strong river currents.

C The palm was blown over the mountains and later became fossilized.

D The palm was once a part of a thriving ancient forest ecosystem.

21 Carcinogens, cancer-causing agents, can be inhaled. As cancer cells reproduce, the disease progresses within the organism. Which system will most likely break down first?

A reproductive system

B nervous system

C respiratory system

D digestive system

22 The passage of genetic instructions from parent to offspring is

A heredity.

B development.

C growth.

D evolution.

23 The father and son look very similar to each other.

Which of the following is responsible for these similarities?

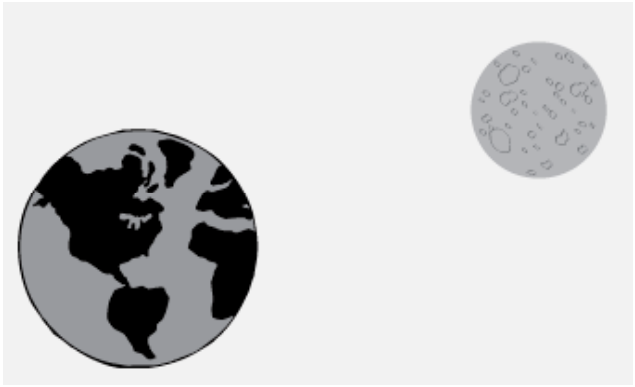
A mitosis

B heredity

C respiration

D evolution

24 Carefully examine the changes in the position of the Earth and moon in the picture below.



Which of the following would increase the gravitational attraction between the Earth and the moon?

A moving them closer together

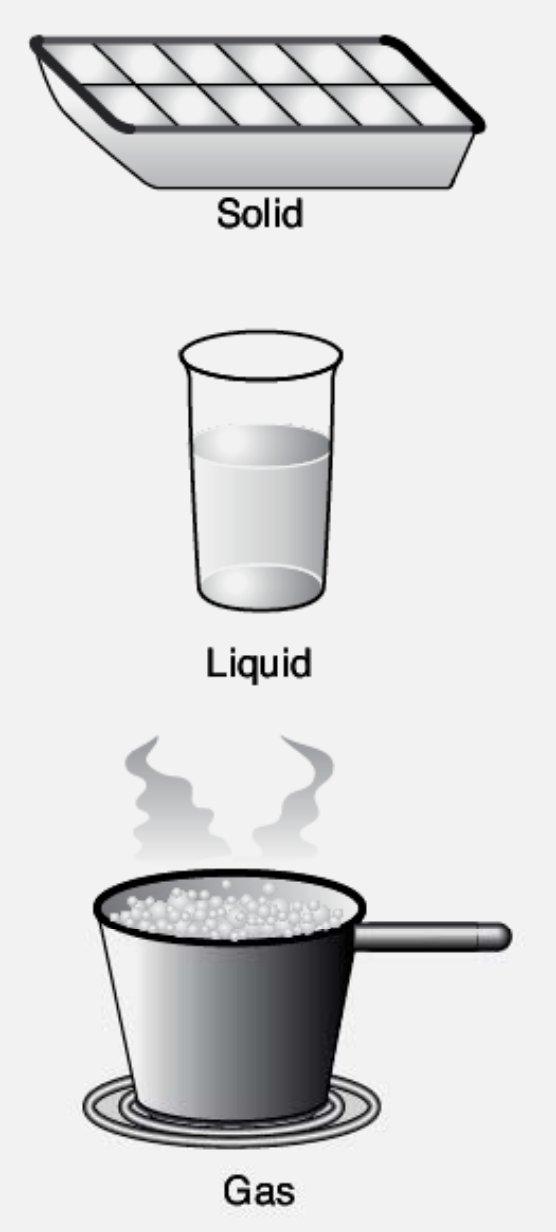
B reversing their revolution

C Earth moving closer to the sun

D Earth losing some of its mass

Write your answer to Question 25 on page 15 in your Answer Booklet.

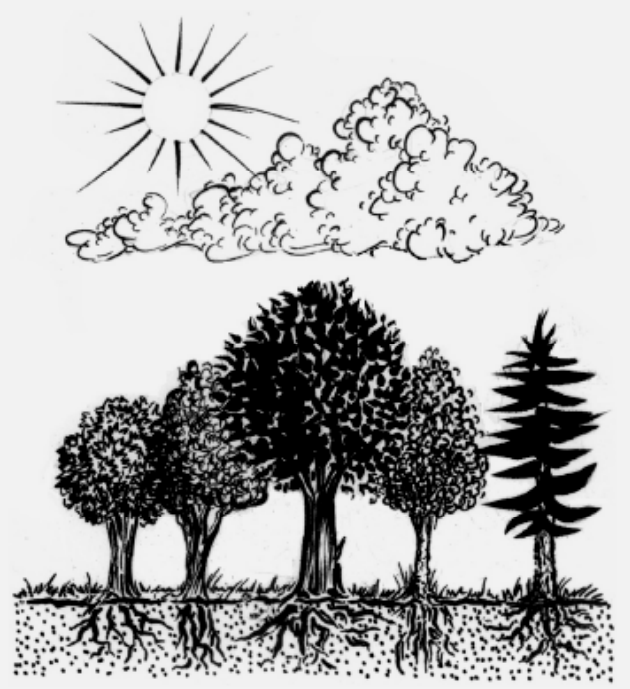
25 Water can come in three phases as shown below.



Explain the motion and position of the particles in each of the phases above.

Write your answer to Question 26 on page 16 in your Answer Booklet.

26 A forest ecosystem is shown below.



Describe three examples of how living things interact with non-living things in the ecosystem above.

Item Number	Ability Level	Answer Key
1	A1	A
2	A2	C
3	A2	A
4	A1	C
5	A1	B
6	A1	A
7	A1	D
8	A2	D
9	A1	C
10	A1	B
11	A1	B
12	A1	B
13	A1	D
14	A1	A
15	A2	B
16	A1	D
17	A2	A
18	A1	A
19	A1	A
20	A2	D
21	A2	C
22	A1	A
23	A2	B
24	A2	A
25	A3	*
26	A3	*

*Indicates a constructed-response item. See the following pages for the rubrics and sample responses.

Rubric for Question 25:

Three key elements

Explain the motion of the particles in the three phases:

- In the solid state the particles are arranged closely together and there is very little movement.
- In the liquid state the particles move farther away from each other and movement is increased.
- In the gas state the particles are colliding with each other and moving very fast.

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.

Rubric for Question 26:

Three key components

Describe any three of the following examples of the non-living interacting with the living in an ecosystem:

- The living plants take in the carbon dioxide in the non-living air to help with photosynthesis.
- The living plants take in nutrients from the non-living soil through their roots.
- The living plants absorb non-living sunlight to convert it into chemical energy to grow.
- The living bacteria in the soil get nutrients from dead organic matter in the soil.

Score Point	Description
3	Three key elements. AND Answer is complete, all parts of question are answered. Answer is correct, although there may be minor errors in some details of the answer. No major errors.
2	Two key elements. AND All parts of question are answered, although some parts of answer may be incomplete or incorrect. Answer contains significant errors.
1	One key element. AND Answer is incomplete, only part of the question is answered, or answer may contain significant errors. OR All parts of question are answered, although major errors/misconceptions are present in answer.
0	Although the student attempts to address the question, the response contains insufficient evidence of appropriate skills/knowledge to successfully accomplish the task.